Draft

Summary Report for Group VI Potential Release Locations, Site Inspection

FORMER MARINE CORPS AIR STATION EL TORO, CALIFORNIA

October 2008

Prepared for:
Base Realignment and Closure
Program Management Office West
San Diego, California

Prepared under:
Naval Facilities Engineering Command
Contract Number N62742-03-D-1837
Contract Task Order 0032
DCN: ET-1837-0032-0001

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Ser BPMOW.MS/1035

OCT 22 2008

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Fellow Federal Facility Agreement Representatives:

Subj: DELIVERY OF THE DRAFT SUMMARY REPORT FOR GROUP VI POTENTIAL RELEASE LOCATIONS, SITE INSPECTION, FORMER MARINE CORPS AIR STATION (MCAS) EL TORO, CALIFORNIA

Submitted for your review is the Draft Summary Report for Group VI Potential Release Locations (PRLs), Site Inspection (SI), Former MCAS El Toro, California (enclosure 1). This summary report for the Group VI PRLs addresses additional sampling conducted at six PRLs to further characterize these areas based on the results from previous PRL investigations. The PRLs in Group VI are PRL 296, PRL 297, PRL 354, PRL 605, PRL 605, and PRL Runway Infield Area. The report includes individual summary reports as attachments for each of the PRLs that provide background information, SI objectives, sampling and analysis summary, investigation results, and conclusions and recommendations. Based on the evaluation of the previous and additional data, the Navy recommends no further investigation for each of the six PRLs.

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Please review the summary report for the Group VI PRLs and provide comments by Friday, November 21, 2008. Should you have questions, please contact Mr. Marc P. Smits, the PRL Remedial Project Manager (619 532-0793).

Sincerely,

for ANTHONY MEGLIOLA
Base Closure Manager
By direction of the Director

Enclosure: (1) Draft Summary Report for Group VI Potential Release Locations, Site Inspection, Former MCAS El Toro, California. October 2008

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Draft

Summary Report for Group VI Potential Release Locations, Site Inspection

FORMER MARINE CORPS AIR STATION EL TORO, CALIFORNIA

October 2008

Prepared for:
Base Realignment and Closure
Program Management Office West
San Diego, California

Prepared by:
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Prepared under:
Naval Facilities Engineering Command
Contract Number N62742-03-D-1837
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ACRONYMS AND ABBREVIATIONS

µg/dL	micrograms per deciliter
µg/kg	micrograms per kilogram
bgs	below ground surface
BNI	Bechtel National, Inc.
BRAC	Base Realignment and Closure
CAMA	calcium acid methanearsonate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	constituent of potential concern
DON	Department of the Navy
DSMA	disodium methanearsonate
DTSC	Department of Toxic Substances Control
EBS	environmental baseline survey
EPA	Environmental Protection Agency
EPC	exposure point concentration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
HI	hazard index
HQ	hazard quotient
ITRC	Interstate Technology and Regulatory Council
MCAS	Marine Corps Air Station
mg/kg	milligrams per kilogram
MSMA	monosodium methanearsonate
NAVFAC SW	Naval Facilities Engineering Command Southwest
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PERF	Project Environmental Review Form
PRG	preliminary remediation goal
PRL	potential release location
RIA	Runway Infield Area
RWQCB	Regional Water Quality Control Board, Santa Ana Region
SEA	Site Evaluation Accomplished
SI	Site Inspection
SRU	silver recovery unit
SVOC	semivolatile organic compound
TPH	total petroleum hydrocarbons
THQ	target hazard quotient
TCR	target cancer risk
UCL	upper confidence limit
VOC	volatile organic compound

1. Introduction

This summary report presents the results for the site inspection (SI) conducted at the following potential release locations (PRLs) - PRL 296, PRL 297, PRL 354, PRL 605, PRL 606, and PRL Runway Infield Area (RIA), at former Marine Corps Air Station (MCAS) El Toro, California.

This SI was conducted in accordance with the *Final Site Inspection Work Plan, Potential Release Locations* (Earth Tech 2008a) (Work Plan). This SI is a follow-up investigation of PRLs that required additional characterization effort based on previous PRL investigations. The initial PRL investigations by the Department of the Navy (DON) were conducted to supplement the *Final Environmental Baseline Survey* (EBS) (NAVFAC SW 2003). The DON is responsible for evaluating each PRL, assessing whether a release may have occurred, preparing the sampling plan, conducting site investigations, and submitting final summary reports documenting the conclusions and recommendations of the Base Realignment and Closure (BRAC) Cleanup Team, comprised of the DON, United States Environmental Protection Agency (EPA), California Department of Toxic Substances Control (DTSC), and the Regional Water Quality Control Board, Santa Ana Region (RWQCB).

This SI was conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). These investigations included a review of available records, visual site inspections, and soil sampling to assess whether significant releases of hazardous substances have occurred into the environment at these PRLs. The investigations reported in this document satisfy the requirements of an SI pursuant to the NCP in Title 40 of the Code of Federal Regulations, Part 300.420 (c). Based on the results of these investigations, this report provides an evaluation of environmental conditions and indicates whether significant releases of hazardous substances have occurred into the environment at these PRLs.

This document was prepared for the BRAC Program Management Office West and the NAVFAC SW as authorized by the Naval Facilities Engineering Command Pacific under contract task order No. 0032 of the Comprehensive Long-Term Environmental Action Navy III program, contract number N62742-03-D-1837.

The background information, issues and concerns, sampling objectives, sampling and analysis summary, investigation results, conclusions, and recommendations for all the SI PRLs are presented in PRL specific summary reports provided as attachments to this report (Attachment 1 through 6).

2. Background

2.1 MCAS El Toro Background

Former MCAS El Toro is located in south-central Orange County, California, approximately 8 miles southeast of Santa Ana and 12 miles northeast of Laguna Beach (Figure 1). Former MCAS El Toro covers approximately 4,738 acres. Land use around former MCAS El Toro includes commercial, light industrial, agricultural, and residential. MCAS El Toro closed on 2 July 1999, as a part of the 1993 BRAC Act.

2.2 PRL Investigation Background

During the 2003 EBS, 76 facilities/features were identified at former MCAS El Toro as being associated with a potential release of hazardous substances to the environment (NAVFAC SW

2003). These facilities or features were assigned PRL designations because of one or more of the following factors:

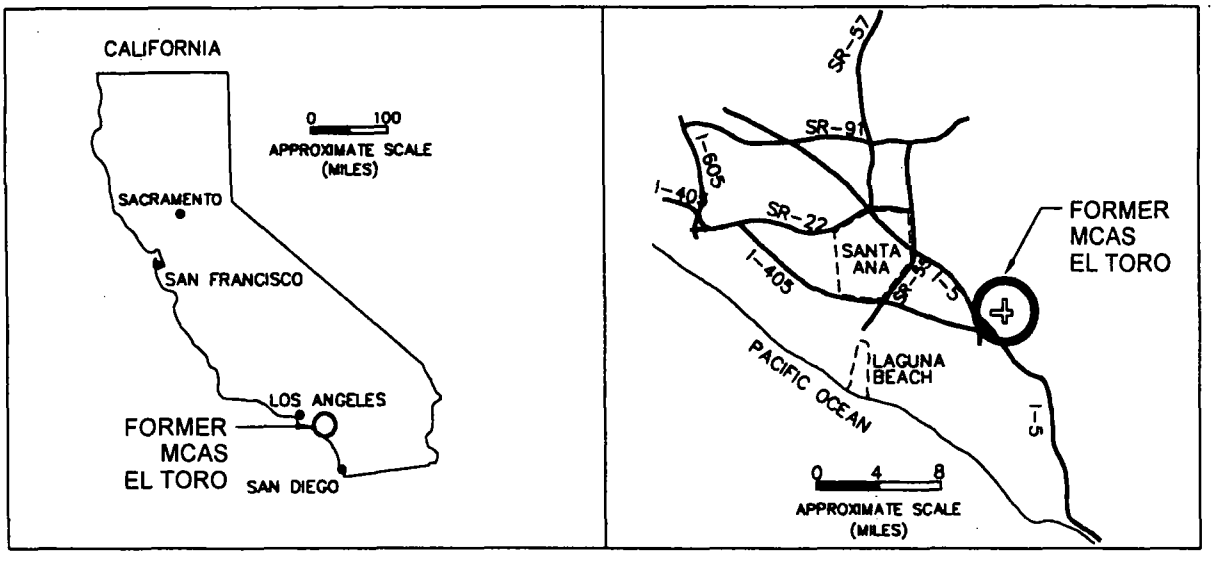
- Records reported a release of hazardous substances to the environment.
- Observations during the visual site inspection conducted in 2002 indicated a potential release of hazardous substances to the environment.
- Activities undertaken during operation of the station had a high probability of releasing hazardous substances to the environment.

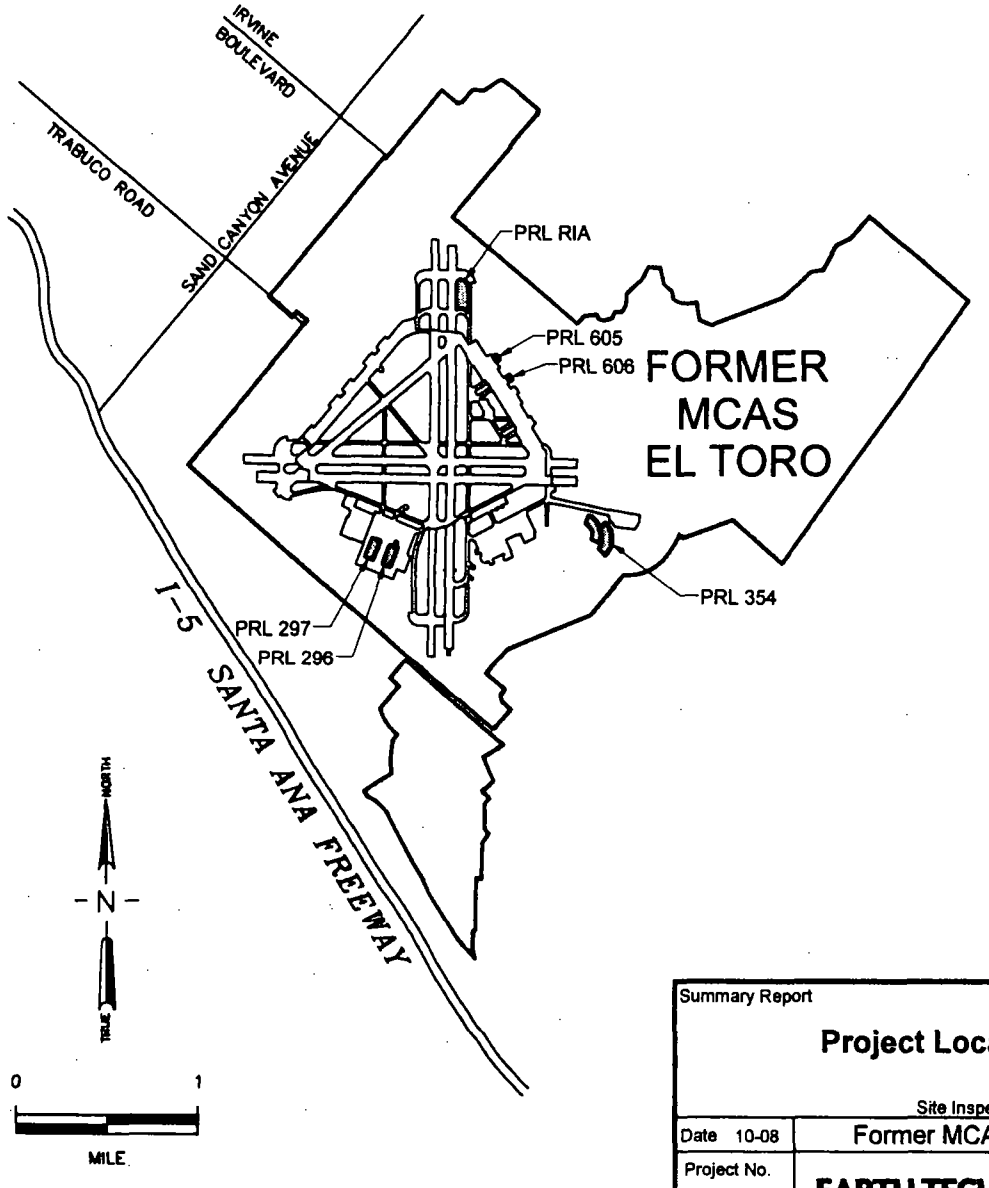
The sites identified were designated as "PRL," followed by the associated building number/feature or the closest geographical feature (e.g., 296, Rail Road, etc.). These PRLs had not been identified during previous investigations or surveys, with the exception of those associated with silver recovery units (SRUs); PRL 46 (SRU 03A), PRL 133 (SRU 03B), PRL 312 (SRU 03), PRL 439 (SRU 010), PRL 457, and PRL 634. These PRLs were previously identified as SRU locations of concern and were considered for further evaluation as PRLs to assess potential releases at these former SRU facilities.

Twenty-three of the 76 PRLs were investigated in 2003, and one PRL (PRL 400) was investigated in February 2004. The results of the 2003 investigations are presented in the final report for the EBS (NAVFAC SW 2003), and the results for the 2004 investigation are presented in a draft technical memorandum (Earth Tech 2004a). Of those investigated, 17 PRLs (PRL 130, PRL 165, PRL 347, PRL 350, PRL 376, PRL 392, PRL 400, PRL 443, PRL 447, PRL 458, PRL 463, PRL 475, PRL 626, PRL 632, PRL 636, PRL 651, and PRL Pesticides Mixing Area) were found to have no significant release and the regulatory agencies concurred that no further investigation was required.

The remaining 59 PRLs are being addressed in six groups. The assessment of Group I, comprising 16 PRLs (PRL 22, PRL 47, PRL 105, PRL 114, PRL 118, PRL 245/246, PRL 374, PRL 442, PRL 617/618, PRL 658, PRL 671/672, PRL 673, PRL 886/887, PRL 1585, PRL 1601, and PRL RIA) was conducted in October 2004, and the results of the investigations were presented in a Summary Report (Earth Tech 2005a). The assessment of Group II, comprising 5 PRLs (PRL 51, PRL 310, PRL 370, PRL 445, and PRL 923) was conducted in January 2005, and the results of the investigations were presented in a Summary Report (Earth Tech 2005b). The assessment of Group III, comprising 14 PRLs (PRL 295, PRL 296, PRL 297, PRL 315, PRL 324, PRL 326, PRL 369, PRL 380, PRL 390, PRL 605, PRL 606, PRL 643, PRL 655, and PRL Rail Road) was conducted in April and May 2005, and the results of the investigations were presented in a Summary Report (Earth Tech 2005c). The sampling for Group IV of the PRLs (6 PRLs: PRL 46, PRL 133, PRL 312, PRL 439, PRL 457, and PRL 634) was conducted from January 2003 through June 2005, and the results of the investigations are provided in a summary report (Earth Tech 2008b). The sampling for Group V of the PRLs (12 PRLs: PRL 235, PRL 298, PRL 299, PRL 359, PRL 360, PRL 368, PRL 372, PRL 386, PRL 716, PRL 745, PRL 747, and PRL Site 7 Unit 1, North Pavement Edge) was conducted from June 2005 through September 2005, and the results of the investigations are provided in a summary report (Earth Tech 2008c). Reports for Groups I, II, III, IV, and V have been submitted to regulatory agencies for review. With the exception of PRL RIA in Group I; PRLs 296, 297, 605, and 606 in Group III; regulatory agencies concurred on the no further investigation recommendations for all of the Group I, II, III, and IV PRLs. EPA has concurred on the no further investigations for all of the Group V PRLs. DTSC has concurred on the no further investigations for all Group V PRLs, except PRL 747.

The RWQCB in letters dated 1 June 2006 and 16 March 2007 concurred on the no further investigation recommendation for PRLs 154 and 435. The remaining 3 PRLs (PRL 127, PRL 388, and PRL 800) are being addressed and closed under the compliance program.





Summary Report

Project Location Map

Site Inspection

Date 10-08	Former MCAS El Toro	Figure 1-1
Project No. 104766	EARTH TECH | AECOM	

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Group VI is comprised of 6 PRLs: PRL 296, PRL 297, PRL 354, PRL 605, PRL 606, and PRL RIA. The sampling for Group VI SI PRLs was conducted in May 2008, and the results of the investigations are provided in this report.

3. Investigation Methodology

For each Group VI SI PRL, records review, visual site inspections, and/or soil sampling were conducted to evaluate whether a release of hazardous substances or pollutants into the environment has occurred. The purpose of the records review and visual site inspection was to identify potential environmentally significant issues. As warranted, the Navy completed soil sampling to further assess the potential environmentally significant issue(s).

3.1 SAMPLING METHODOLOGY

Once the environmentally significant issues were identified for each PRL, a sampling program was designed to assess whether a significant release of hazardous substances occurred. Sample locations were selected based on the following criteria:

- Where a report or visual evidence of a direct release of hazardous substance to the environment existed, such as stained soil or stressed vegetation, soil samples were collected at that location.
- Where a report or visual evidence of a release existed on concrete or pavement, such as significant staining, etching, or corrosion, soil samples were collected below the bottom of the floor slab or pavement.
- Where past operations involved the use of hazardous substances and the presence of features such as sumps, floor drains, storm drains, cracks, or pits may have resulted in the release of these substances to the environment, soil samples were collected in the vicinity of the features.
- Where evidence of direct releases of hazardous substances containing heavy metals to the sewer via drain pipes existed based on information regarding past activities or operations, samples of the drain pipe contents were collected to verify the constituents of potential concern (COPCs) at the site. Soil samples were collected beneath or adjacent to the drains to determine if there was a significant release of hazardous substances to the environment. Drain samples were analyzed for specific metals related to the substances used at the facility.

3.1.1 SI Sampling Design and Objectives

Soil sampling conducted in May 2008 was in accordance with the Work Plan. The objectives of the sampling were:

- To characterize the lateral and vertical distribution of lead in soil at PRLs 296 and 297.
- To characterize the lateral and vertical distribution of lead and polynuclear aromatic hydrocarbons (PAHs) in soil at PRL 354.
- To characterize the lateral and vertical distribution of arsenic in soil at PRLs 605 and 606.
- Verification sampling, following excavation at PRL RIA, to demonstrate that soil exceeding the screening goals for PAHs has been removed.

3.2 DATA EVALUATION PROCEDURES

Based on the sampling design presented in the Work Plan, the steps for evaluating the data obtained from SI soil sampling are presented below and are summarized on Figure 2.

- If the maximum reported concentrations of metals, and organic analytes are below either their respective preliminary remediation goals (PRGs) or background value in all soil samples, then no further investigation was needed.

- If the maximum reported concentrations of metals, and organic analytes exceed their respective PRGs or background value in any of the soil samples, then:

    - A statistical evaluation including identification of statistical outliers and calculation 95 percent upper confidence limit (UCL) of the mean for all chemicals using Pro-UCL Software was conducted.

    - Exposure point concentration (EPC) was established i.e. lesser of either 95 percent UCL (accounting for outliers) or maximum reported concentration.

    - If the carcinogenic risk is less than 10^{-6} and the non-cancer HI is less than 1, then no further investigation was recommended.

    - If the carcinogenic risk is greater than 10^{-6} but is within the NCP-defined risk management range of 10^{-6} to 10^{-4} and the non-cancer HI is greater than 1, then other lines of evidence including site specific conditions such as bioavailability, solubility, exposure pathways and/or characterization were further evaluated.

3.2.1 Screening Levels

As described in the Work Plan and consistent with previous PRL evaluations, risk screening was performed using EPA Region 9 residential PRGs (EPA Region 9 2004a) or California-modified PRGs. For arsenic, the MCAS El Toro background level (Bechtel National, Inc. [BNI] 1996a) was used as the screening level. In addition, former MCAS El Toro background (BNI 1996 a&b) levels have been used for comparative purposes for constituents with no PRG.

The screening levels for contaminants at the selected PRLs are presented in Table 1.

Table 1: Screening Levels

COPCs	EPA Region 9 or California-modified residential PRGs*
PRL 296, 297, 354	
Lead	150 mg/kg
PRL 605, 606	
Arsenic	6.86 mg/kg**
PRL 354, RIA	
Acenaphthene	3,700,000 µg/kg
Acenaphthylene	-----
Anthracene	22,000,000 µg/kg
Benz(a)anthracene	620 µg/kg
Benzo(a)pyrene	62 µg/kg
Benzo(b)fluoranthene	620 µg/kg
Benzo(g,h,i)perylene	29 µg/kg***
Benzo(k)fluoranthene	380 µg/kg
Chrysene	3,800 µg/kg
Dibenz(a,h)anthracene	62 µg/kg

Table 1: Screening Levels

COPCs	EPA Region 9 or California-modified residential PRGs*
Fluoranthene	2,300,000 µg/kg
Fluorene	2,700,000 µg/kg
Indeno(1,2,3-cd)pyrene	620 µg/kg
2-Methylnaphthalene	-----
Naphthalene	1,700 µg/kg
Phenanthrene	18 µg/kg***
Pyrene	2,300,000 µg/kg

Notes:
* lesser of the two (EPA Region 9 2004a)
** MCAS El Toro Background Value (BNI 1996a)
*** Former MCAS El Toro anthropogenic (background) reference levels (BNI 1996b) have been used for screening levels for constituents where no PRG exists
--- No PRG or former MCAS El Toro anthropogenic (background) reference levels exists

In accordance with the Work Plan, risk screening was performed for each Group VI PRL to evaluate the risks associated with potential exposures to chemicals identified in the soil at each PRL. The results of this risk screening are presented in the summary reports for individual PRLs provided as attachments to this report.

3.3 RISK SCREENING METHODOLOGY

Risk screening was performed to evaluate the risks associated with potential exposures to chemicals identified in the soil at each PRL.

The approach used for the risk screening essentially consists of three elements: selection of COPCs, EPC quantification, and risk quantification.

3.3.1 Selection of COPCs

For each PRL, COPCs were identified as the chemicals that were reported in at least one sample and have EPA Region 9 or California-modified cancer or non-cancer residential PRGs (EPA 2004a).

3.3.2 EPC Quantification

The maximum reported concentrations of COPCs were initially used as EPCs for risk screening. If the concentrations of organic analytes were greater than their respective PRGs and concentrations of metals were not within the range established in the background study, the 95 percent UCL of the mean concentration of the COPCs was calculated, and compared with the maximum reported concentration; and lesser of the two values (95 percent UCL and maximum reported concentration) was then used as the EPC for the COPC.

The 95 percent UCL of the mean concentration of COPCs at the PRLs was estimated using the ProUCL Version 4 program based on EPA (2002) guidance.

3.3.3 Risk Quantification

For each PRL, excess (incremental) cancer risk using EPC and a respective carcinogenic PRG was estimated using the following formula:

$$Excess\ Cancer\ Risk = TCR \times \frac{EPC_i}{PRG_i}$$

where:

TCR = target incremental lifetime cancer risk of 10^{-6}

EPC_i = EPC for $COPC_i$

PRG_i = EPA Region 9 or Cal-modified PRG for $COPC_i$ in soils based on carcinogenic effects

A Hazard Quotient (HQ), using EPC and noncarcinogenic PRG, will be calculated using the following formula:

$$HQ = THQ \times \frac{EPC_i}{PRG_i}$$

where:

THQ = target HQ of 1

PRG_i = EPA Region 9 or Cal-modified PRG for $COPC_i$ in soils based on noncarcinogenic effects

The cumulative residential excess cancer risk for exposure to multiple COPCs at a PRL will be estimated using the following equation:

$$Cumulative\ Excess\ Cancer\ Risk = \sum \left[TCR \times \frac{EPC_i}{PRG_i} \right]$$

The cumulative noncarcinogenic hazard index (HI) for exposure to multiple COPCs at a PRL will be estimated as follows:

$$Cumulative\ Noncarcinogenic\ HI = \sum \left[THQ \times \frac{EPC_i}{PRG_i} \right]$$

3.4 LABORATORY ANALYSIS AND QUALITY ASSURANCE

Laboratory analysis and data validation were performed by APPL, Inc. of Fresno, California and Laboratory Data Consultants of Carlsbad, California, respectively, in accordance with the specifications and requirements of the Work Plan. Laboratories solicited for this project successfully completed evaluation by the Naval Facilities Engineering Service Center. Laboratory performance was further evaluated through data package reviews and oversight by the project chemist.

Data reported in the project report are flagged with the following appropriate qualifiers to indicate the usability:

- J estimated concentration
- N presumptive evidence of the identification of an analyte
- R rejected data (unusable)
- U not reported above laboratory reporting limit

Combinations of qualifiers such as UJ and NJ are possible. Where the validation qualifiers affect the project decision recommendations, the individual PRL reports discuss the issues and the uncertainty or qualifications of the conclusions.

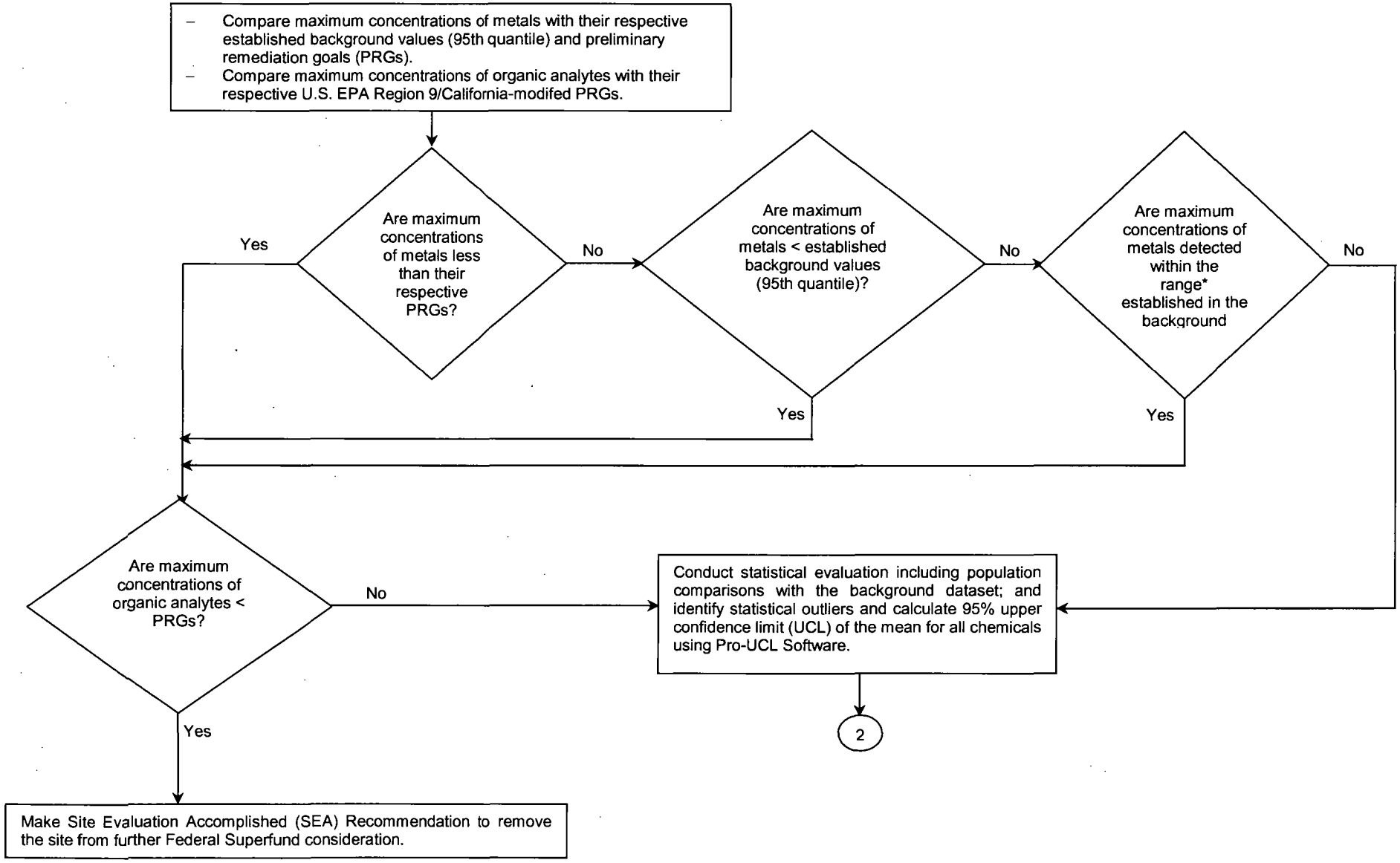
4. Investigation Results and Recommendations

The background information, issues and concerns, sampling and analysis summary, investigation results, conclusions, and recommendations for all Group VI SI PRLs are presented in summary reports provided as attachments to this report. The attachments are organized as follows:

- Attachment 1: Summary Report – PRL 296
- Attachment 2: Summary Report – PRL 297
- Attachment 3: Summary Report – PRL 354
- Attachment 4: Summary Report – PRL 605
- Attachment 5: Summary Report – PRL 606
- Attachment 6: Summary Report – PRL RIA

Table 1 presents an assessment summary and conclusions for the Group VI SI PRLs.

Figure 2: Decision Rules for PRL Characterization Sampling



*Range is defined as the metals concentrations ranging up to the maximum detected concentration in the background evaluation conducted by Bechtel (BNI 1996a).

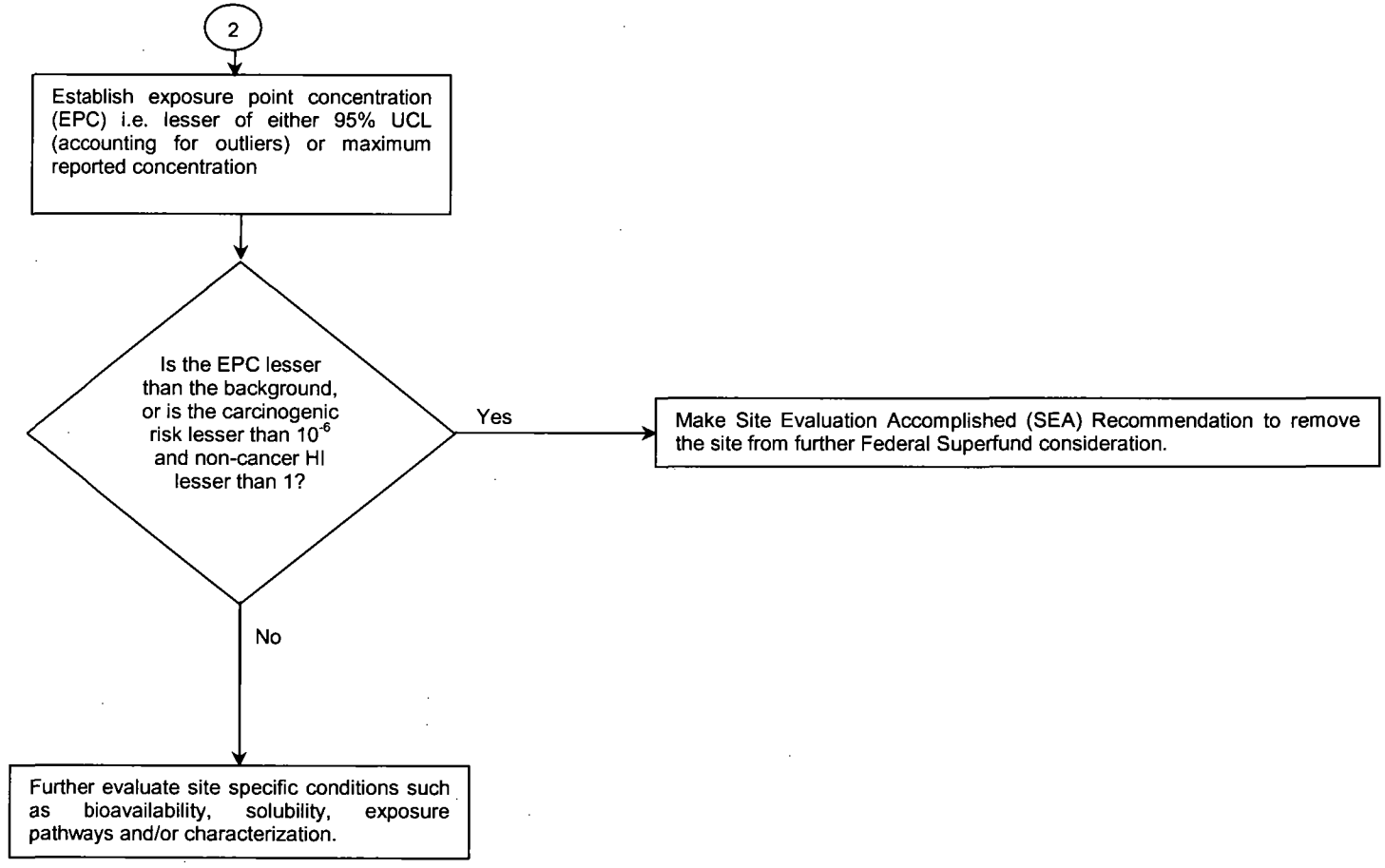

2
Establish exposure point concentration (EPC) i.e. lesser of either 95% UCL (accounting for outliers) or maximum reported concentration
Is the EPC lesser than the background, or is the carcinogenic risk lesser than 10^{-6} and non-cancer HI lesser than 1?
Yes
Make Site Evaluation Accomplished (SEA) Recommendation to remove the site from further Federal Superfund consideration.
No
Further evaluate site specific conditions such as bioavailability, solubility, exposure pathways and/or characterization.

Table 2: Evaluation Summary - Group VI PRLs

PRL	Background	Issues and Concerns	SI Sampling and Analysis Summary	Investigation Results	Recommendations
296	PRL 296 is associated with Building 296, located in the southwest quadrant of former MCAS El Toro, California. The building was listed as A and R Hangar in the 1948 and 1949 Station lists; and as A and R Hangar No. 2 in the 1950 and 1954 Station lists. The 1958 facility description states that it was a Hangar and a Maintenance Hangar/Aircraft Ground Support Equipment Shop/Engine Shop in the 1973 list; and as Ground Support Equipment Shop in the 1997 list. The last known description was Maintenance Hangar OH Space, Transformer Room, Boiler Room, Armory, Storage, and Maintenance Hangar. **April 2005 Soil Sampling**. Based on the issues and concerns, identified during the records review, previous investigations, and visual site inspections conducted in 2002 in support of the 2003 EBS (NAVFAC SW 2003), and in 2004 as part of supplemental site reconnaissance; soil sampling was conducted for PRL 296 in April 2005 as discussed in the Group III PRL package submitted for regulatory review in October 2005 (Earth Tech 2005c). Eleven soil samples were collected from nine boreholes (HA1 through HA9) at depths ranging from 1-foot to 10 feet bgs. These samples were analyzed for metals (cadmium, chromium, cobalt, copper, lead, mercury, nickel, silver, and zinc), cyanide, and pH. Lead was reported at a concentration of 155 mg/kg in the soil sample collected at location HA2 at 10 feet bgs (adjacent to Anodizing Pit No. 2), which exceeded the California-modified residential PRG of 150 mg/kg.	EPA concurred with the recommendation for a no further action for PRL 296 in a letter dated 3 November 2005. However, the California DTSC requested additional investigation to characterize the distribution of lead at location HA2 in a letter dated 3 February 2006.	Eleven soil samples were collected from five boreholes (at and around location HA2 at locations HA10 through HA13) at depths ranging from 5 feet bgs to 15 feet bgs to assess the lateral and vertical distribution of lead. This soil sampling was conducted in May 2008 in accordance with the *Final Site Inspection Work Plan, Potential Release Locations* (Earth Tech 2008a) (Work Plan).	None of the additional soil samples collected in the vicinity of location HA2 contained lead concentrations exceeding it's screening level i.e., California-modified residential PRG of 150 mg/kg. These results indicate that the lead concentration reported at location HA2 in 2005 is highly localized and is not indicative of a widespread release. Evidence to support this conclusion includes the absence of any other elevated metal concentrations at HA2 during the previous soil sampling in 2005, which would likely be present if a release of contaminants due to processing activities had occurred. Further, samples collected at other process pits with similar activities at Building 296 during the 2005 sampling did not have elevated concentrations of lead or other metals either, as might be expected if a release due to processing operations had occurred. Therefore, it does not appear that the single detection of lead above the California-modified residential PRG during the 2005 investigation is indicative of wide-spread release. The EPC for lead (the lesser of the two values i.e., 95 percent UCL and maximum reported concentration) was estimated to be 89.7 mg/kg, which is less than the California-modified residential soil PRG of 150 mg/kg. The estimated cancer risk at PRL 296 is less than the EPA point of departure value of 10^{-6} and the noncancer hazard at this PRL is less than the target HI of 1.	No Further Investigation
297	PRL 297 is associated with Building 297, located in the southwest quadrant of the former MCAS El Toro, California. The building was listed as A and R Hangar in the 1948 and 1949 Station lists; A and R Hangar No. 3 in the 1950 and 1954 Station lists; and as a Hangar in the 1958 list. The facility description was as a Maintenance Hangar, Avionics Shop/Airframe Shop, Parachute and Survival Equipment, GRO in the 1973 list; and as Maintenance Hangar OH Space in the 1997 list. The last known description was Maintenance Hangar 02 Space, Maintenance Hangar 01 Space, Maintenance Hangar OH Space, Boiler Room. **April 2005 Soil Sampling**. Based on the issues and concerns identified during the records review, previous investigations, and visual site inspections conducted in 2002 in support of the 2003 EBS (NAVFAC SW 2003), and in 2004 as part of supplemental site reconnaissance; soil sampling was conducted for PRL 297 in April 2005 as discussed in the Group III PRL package submitted for regulatory review in October 2005 (Earth Tech 2005c). Twenty four soil samples were collected from fourteen boreholes (HA1 through HA14) at depths ranging from 1-foot to 16 feet bgs. These samples were analyzed for metals (cadmium, chromium, cobalt, copper, lead, nickel, silver, and zinc), cyanide, and pH. Lead was reported at a concentration of 214 mg/kg in the soil sample collected at location HA1 at 4 feet bgs in the Tank Shop which exceeded the California-modified residential PRG of 150 mg/kg, and at a concentration of 140 mg/kg in the soil sample collected at location HA11 at 10 feet bgs.	EPA concurred with the recommendation for a no further action for PRL 297 in a letter dated 5 January 2006. However, the California DTSC requested additional investigation to characterize the distribution of lead at locations HA1 and HA11 in a letter dated 3 February 2006.	Seventeen soil samples were collected from nine boreholes (at and around location HA1 at locations HA15 though HA17, and HA21; and at and around location HA11 at locations HA13, and HA18 through HA20) at depths ranging from 3.5 feet bgs to 15 feet bgs to assess the lateral and vertical distribution of lead. This soil sampling was conducted in May 2008 in accordance with the Work Plan.	None of the additional soil samples collected in the vicinity of locations HA1 and HA11 contained lead concentrations exceeding its screening level i.e., California-modified residential PRG of 150 mg/kg. These results indicate that the lead concentration reported at locations HA1 (214 mg/kg) and HA11 (140 mg/kg) in 2005 are highly localized and are not indicative of a significant release. Evidence to support this conclusion includes the absence of any other elevated metal concentrations at locations HA1 and HA11 during the previous sampling in 2005, which would likely be present if a release of contaminants due to processing activities had occurred. Further, samples collected at other process pits with similar activities at Building 297 during the 2005 sampling did not have elevated concentrations of lead or other metals either, as might be expected if a release due to processing operations had occurred. Therefore, it does not appear that the single detection of lead above the California-modified residential PRG at location HA1 during the 2005 investigation is indicative of wide-spread release. The EPC for lead (the lesser of the two values i.e., 95 percent UCL and maximum reported concentration) was estimated to be 76.3 mg/kg, which is less than the California-modified residential soil PRG of 150 mg/kg. The estimated cancer risk at PRL 297 is less than the EPA point of departure value of 10^{-6} and the noncancer hazard at this PRL is less than the target HI of 1.	No Further Investigation
354	PRL 354 refers to the former Skeet Range that was located near the eastern boundary of the station, northeast of the existing golf course. **Soil Sampling 2005**. Sampling conducted in June 2005 used a composite sample approach that took into consideration the heterogeneous nature of matrix materials and contaminants at firing ranges. Approximate boundaries of the shot fall areas for the two skeet range orientations and estimated areas of maximum shot fall were superimposed on the site plan, based on information from ITRC guidance (ITRC 2003). This information was used to bias sample locations to potentially affected areas. Eight sample locations (HA1 through HA8) were selected to cover the different shot-fall areas and to target locations where clay pigeon fragments were found. At each location, three subsamples were collected at the surface, spaced in a triangular pattern at approximately 10 feet from the center point. The subsamples from each location were composited and analyzed for antimony, arsenic, lead, and PAHs. Following initial analysis, discrete samples for HA4, HA5, HA7, and HA8 were analyzed for arsenic and the discrete samples for HA7 were analyzed for lead. Lead was reported at concentrations exceeding the residential PRG or former MCAS El Toro background value in the composite soil samples collected at locations HA1 through HA3, and HA6 through HA8; and in the discrete soil samples collected at locations HA7A, HA7B, and HA7C. PAHs were reported at concentrations exceeding their residential PRGs in the composite soil samples collected at locations HA1, HA2, HA3, and HA6.	The 2005 soil sampling results indicated that composite soil samples at locations HA1 through HA3 and HA6 through HA7 (0 feet to 0.2 feet bgs) exceeded the EPA Region 9/California-modified residential soil PRGs for lead and PAHs. Therefore, discrete samples at the previous sampling locations as well as step out samples were collected to characterize the lateral and vertical distribution of lead and PAHs in this area.	Thirteen soil samples were collected at PRL 354 (at locations HA1 through HA3, HA6, HA7, and HA9 through HA16) at the surface (0 to 0.2 feet bgs) to characterize the distribution of lead and PAHs in soil exceeding the EPA Region 9 residential PRG/California-modified PRG concentration. The samples were collected using disposable trowels. A total of seven deeper vertical soil samples (0.5-foot to 1 feet bgs) were analyzed at locations (HA1 through HA3, HA6, HA9, HA15, and HA16) where concentrations of lead and PAHs were reported above residential PRG values in the surface samples. This soil sampling was conducted in May 2008 in accordance with the Work Plan.	PAHs (benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3,-cd]pyrene) were reported at concentrations exceeding their respective residential PRGs in the surface and deeper soil samples collected at locations HA1, HA2, HA3, HA9, HA15, and HA16. The maximum reported PAH concentrations were associated with the surface sample collected at location HA2. The PAHs concentrations in the deeper soil samples were less than the surface soil samples at all locations except at location HA1. Lead was reported at concentrations exceeding its California-modified residential PRG in the surface soil samples collected at locations HA2, HA3, HA6, and HA16; and in the deeper soil samples collected at locations HA2, HA6, and HA16. Lead was reported at concentrations ranging from 8.9 to 332 mg/kg. The reasonable maximum EPC of lead was estimated to be 157.1 mg/kg, which is comparable with California-modified residential PRG of 150 mg/kg and is less than the EPA Region 9 residential soil PRG of 400 mg/kg. The DTSC's Lead Risk Assessment Spreadsheet, Version 7 indicated that this soil lead concentration would be protective of a child receptor for residential exposure scenario at the site. Since the 95 percent UCL of the mean concentration of lead does not result in an exceedance of the blood lead level of 10 µg/dL, lead does not pose any adverse health risk and does not warrant further investigation. The cumulative carcinogenic risk due to potential exposure to reasonable maximum EPC of constituents analyzed at PRL 354 is $2x10^{-5}$. The cumulative carcinogenic risk corresponding to a benzo(a)pyrene equivalent EPC value of 1,068 µg/kg is $2x10^{-5}$. The computed carcinogenic risk for both scenarios is	No Further Investigation

Table 2: Evaluation Summary - Group VI PRLs

PRL	Background	Issues and Concerns	SI Sampling and Analysis Summary	Investigation Results	Recommendations
				within the EPA-established risk management range of 10^{-6} to 10^{-4}. Additionally, the noncancer hazard at this PRL is less than the target HI of 1. It should be noted that this value of the cumulative carcinogenic risk ($2x10^{-5}$) corresponding to the 95% UCL of the benzo(a)pyrene equivalents is likely an overestimation of cancer risk across the whole site and is not representative of actual site risk. This is because the maximum reported benzo(a)pyrene equivalent concentration associated with the surface sample collected at location HA2 was found to be a statistical outlier. The cumulative carcinogenic risk reduces further to $9x10^{-6}$ if the statistical outlier is not included in the risk assessment. Based on these findings, the impacted soil is assessed not to pose a risk to human health or groundwater, and the ecological risk is not an issue due to the fact that these areas were historically industrial in nature and did not support viable habitat.	
605	PRL 605 is associated with Building 605 and is located in the northeast quadrant of former MCAS El Toro, California. The building was constructed in 1962, and identified as a Maintenance Hanger in 1973, which is the last known description. **Soil Sampling 2003**. In concurrence with the regulatory agencies, soil sampling was conducted for PRL 605 in 2003 (NAVFAC SW 2003). Soil samples were collected from two locations, HA1 at a depth of 1.5 feet bgs, and HA2 at a depth of 2.0 feet bgs. Soil samples from both locations were analyzed for VOCs, SVOCs, TPH, and metals. Arsenic was reported at a maximum concentration of 29.8 mg/kg (7.0 mg/kg in the duplicate sample) in the soil sample from location HA2, which exceeded its residential PRG (EPA 2004a) and former MCAS El Toro background concentration (BNI 1996a). **Soil Sampling 2005**. Pursuant to letters dated 11 April 2003 by EPA and the California DTSC recommending further investigation in the vicinity of location HA2, one soil sample was collected at location HA3 adjacent to HA2 as discussed in the Group III PRL package submitted for regulatory review in October 2005 (Earth Tech 2005c). The soil sample was collected at a depth of 1.5 feet below the bottom of the floor slab by hand auger and analyzed for arsenic. Arsenic was reported at a concentration of 2.9 mg/kg at location HA3, which is less than former MCAS El Toro background value of 6.86 mg/kg. This result indicated that the arsenic concentration reported at location HA2 in 2003 was consistent with the range observed in the background evaluation and was not indicative of a release.	EPA concurred with the recommendation for a no further action for PRL 605 in a letter dated 3 November 2005. However, the California DTSC recommended additional investigation to characterize the distribution of arsenic at location HA2 in a letter dated 3 February 2006.	Eight soil samples were collected from five boreholes (at and around location HA2 at locations HA3 through HA6) at depths ranging from 1.5 feet bgs to 4 feet bgs to assess the lateral and vertical distribution of arsenic. This soil sampling was conducted in May 2008 in accordance with the Work Plan.	Arsenic was reported at a concentration of 16 mg/kg and 228 mg/kg in the shallow soil samples (1.5 feet bgs) collected at location HA4 (adjacent to the building) and HA6 (inside the building), respectively. Both these samples exceeded the former MCAS El Toro background value of 6.86 mg/kg. None of the reported concentrations of arsenic in the deeper soil samples (4 feet bgs) exceeded the former MCAS El Toro background value. A statistical analysis conducted using Dixon's outlier test indicates that the maximum reported concentration of arsenic of 228 mg/kg reported during the 2008 investigation is a statistical outlier. Based on a review of pre-construction boreholes at PRL 605, the material encountered before the construction of Building 605 is similar to the material encountered during the SI soil sampling. In addition, a review of construction drawings for Building 605 indicates the top of the 11-inch concrete finished floor was at an elevation consistent with the existing/original grade. The drawings called for the top two feet of the native soil to be re-excavated and compacted. Based on the comparison of the lithology encountered during the SI and the descriptions from the preconstruction drawings there is no discernable difference in the soil encountered which suggests that no imported fill was required for construction. The arsenic concentrations exceeding the former MCAS El Toro background are not attributable to Marine Corps aircraft maintenance activities and appears to reflect conditions prior to the start of operations at the hangar. The presence of the arsenic does not represent a CERCLA release per CERCLA section 101(22). The presence of elevated arsenic concentrations in only the top of the foundation suggests some form of surface application. Use of registered organic arsenic based herbicides would have been legal and would not constitute a CERCLA release. The use of herbicides would not have been unexpected due to the foundation design and the required cast in place piles. To minimize the potential of damaging the piles, it is very likely that over-excavation and compaction of the foundation soil would have been completed prior to the installation of the piles. Over 50 piles were required, so there would have been a period a ranging from two weeks to a month during which the compacted foundation would have potentially been open to the elements prior to the placement of the concrete slab on grade. It is therefore plausible that weeds/crabgrass may have started to germinate and some form of abatement would have been required. Organical-arsenical herbicides such as monosodium methanearsonate (MSMA), disodium methanearsonate (DSMA), calcium acid methanearsonate (CAMA), cacodylic acid (dimethylarsinic acid), and cacodylic acid's sodium salt (sodium cacodylate) have been registered under Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) since the 1950's and 1960s. The legal us of these pesticides overlaps the period when Building 605 was constructed (i.e. 1962). CERCLA exempts from its reporting requirements the application of a pesticide product registered under FIFRA or the handling or storage of such product by an agricultural producer. However, accidents, spills, improper application, and improper disposal must be reported. Thus the source of the elevated arsenic may be attributable to herbicide application. Based on these findings, a no further investigation is recommended for the potential releases associated with the aircraft maintenance activities. However, upon transfer the new land owner will be notified about the presence of these localized elevated arsenic concentrations. The notification will also state that these herbicides containing arsenic appear to have been legally applied and do not represent a CERCLA release.	No Further Investigation

Table 2: Evaluation Summary - Group VI PRLs

PRL	Background	Issues and Concerns	SI Sampling and Analysis Summary	Investigation Results	Recommendations
606	PRL 606 is associated with Building 606 and is located in the northeast quadrant of former MCAS El Toro, California. The building was constructed in 1965 over an area which was formerly occupied by Building 116 which was used for administrative purposes. Building 606 was identified as a Maintenance Hanger in 1973, which is the last known description. **Soil Sampling 2003**. Soil sampling was conducted for PRL 606 in 2003 (NAVFAC SW 2003). Soil samples were collected at locations HA1 and HA2 at depths of 1.5 feet bgs, and 2.0 feet bgs. Soil samples from both locations were analyzed for VOCs, SVOCs, TPH, and metals. Arsenic was reported at concentrations of 6.9 and 11.1 mg/kg in the soil samples collected at locations HA1 and HA2, respectively. The 2004 residential carcinogenic PRG and the El Toro background concentration for arsenic are 0.062 and 6.86 mg/kg, respectively. In a letter dated 11 April 2003, the California DTSC recommended additional assessment to determine the distribution of arsenic in the vicinity of location HA2. **Soil Sampling 2005**. Soil sampling was conducted for PRL 606 in May 2005 as discussed in the Group III PRL package submitted for regulatory review in October 2005 (Earth Tech 2005c). One soil sample was collected at location HA3 approximately 6-inches from location HA2. The soil sample was collected at a depth of 1.5 feet below the bottom of the floor slab by hand auger and analyzed for arsenic. Arsenic was reported at a concentration of 3.6 mg/kg at location HA3 which is less than former MCAS El Toro background value of 6.86 mg/kg (BNI 1996a). This result indicated that the arsenic concentration reported at location HA2 in 2003 was consistent with the range observed in the background evaluation and was not indicative of a release.	EPA concurred with the recommendation for a no further action in a letter dated 3 November 2005. However, the California DTSC recommended additional investigation to characterize the distribution of arsenic at location HA2 in a letter dated 3 February 2006.	Eight soil samples were collected from five boreholes (at and around location HA2 at locations HA3 through HA6) at depths ranging from 1.5 feet bgs to 4 feet bgs to assess the lateral and vertical distribution of arsenic. This soil sampling was conducted in May 2008 in accordance with the Work Plan.	Arsenic was reported at concentrations of 231 mg/kg, 217 mg/kg, and 127 mg/kg in the shallow soil samples (1.5 feet bgs) collected at locations HA4, HA5, and HA6 (all inside the building), respectively. All these samples exceeded the former MCAS El Toro background value of 6.86 mg/kg. These samples were collected at a depth of 1.5 feet below the top of floor slab and within the top 8 inches of the foundation soil. None of the reported concentrations of arsenic in the deeper soil samples (4 feet bgs) exceeded the former MCAS El Toro background value. Thus, these reported concentrations of arsenic are localized within the top of the foundation layer. The reasonable maximum EPC for arsenic (231 mg/kg) accounts for nearly 100 percent of the cancer risk and nearly 85 percent of the noncancer HI. Building 606 was constructed under the same contract as Building 605, therefore the considerations discussed above for PRL 605, apply to PRL 606. Therefore, a no further investigation is recommended for the potential releases associated with the aircraft maintenance activities. However, upon transfer the new land owner will be notified about the presence of these localized elevated arsenic concentrations. The notification will also state that these herbicides containing arsenic appear to have been legally applied and do not represent a CERCLA release.	No Further Investigation
Runway Infield Area	PRL RIA is associated with Station's Runways, which is located in the northwest quadrant of former MCAS El Toro, California. **Soil Sampling 2003.** Based on the review of available documentation, including similar activities at other Department of Defense installations, and in concurrence with the regulatory agencies, sampling along the edges of concrete runways was conducted during 2003. Soil samples were collected from a total of 13 areas and analyzed for PCBs, PAHs, and TPH. At each area, two soil samples were collected from boreholes drilled approximately 25 feet apart (designated A and B, respectively: e.g., HA7A and HA7B), and composited for laboratory analysis. The only analyte exceeding its residential PRG was benzo(a)pyrene (160 µg/kg) reported in the soil sample from borehole HA7. Based on the 2003 sampling results, the BCT concurred with the finding of no further action for the remainder of the runway area (NAVFAC SW 2003), except for the area in the vicinity of sampling location HA7. In a letter dated 11 April 2003, EPA requested further evaluation in the vicinity of location HA7. In a letter dated 11 April 2003, the California DTSC recommended that discrete samples be collected from locations HA7A and HA7B and analyzed for PAHs. To further investigate the area in the vicinity of sampling location HA7, this area was designated as PRL RIA. **Soil Sampling 2004**. In March 2004, soil samples were collected from five locations in the vicinity of HA7 in accordance with the sampling plan presented to the BCT. All five samples were collected at a depth of 6 inches bgs and analyzed for PAHs. Three samples, collected from locations HA16, HA17, and HA18, were analyzed for TPH. Results of the March 2004 sampling event indicated a potential for a wider PAH distribution in the PRL RIA. Therefore, based on the analyses of trends in PAH concentrations and the site conceptual model, which indicates greater probability of the presence of PAHs closer to the edge of the runway, six additional soil samples were collected in October 2004 as discussed in the Group I PRL package submitted for regulatory review in February 2005 (Earth Tech 2005a). The samples were collected from locations HA19 through HA24 at a depth of 6 inches bgs and analyzed for PAHs and TPH (as diesel oil and motor oil). The analytes that exceeded residential PRGs were benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and dibenz(a,h)anthracene. All profiles show a rapid drop in concentrations of PAHs at a distance of approximately 20 to 30 feet from the edge of the runway. The profiles also showed that soil with PAH concentrations greater than residential PRGs could be conservatively approximated to extend 50 feet from the edge of the runway. No discernable trend was observed in PAH concentrations along the length of the runway as evident from the analytical results of samples.	Surface soil extending 50 feet from the edge of the runway was removed during runway demolition and grading operations performed by the developer, pursuant to the PERF completed for this project (November 1, 2006). The PERF was submitted to the DON for approval prior to start of the work. The DON determined that the proposed work would not affect the investigations, approved the PERF (November 1, 2006), and forwarded it to EPA and DTSC for their concurrence. The regulatory agencies reviewed and concurred with this PERF (November 2006). Therefore, soil sampling using systematic and grid sampling was conducted at PRL RIA to characterize the current distribution of PAHs after grading operations that were performed pursuant to the PERF.	A total of 28 soil samples (locations DSS1 through DSS28) were collected at PRL RIA at the bottom of the excavation to verify the absence or presence of soil with PAHs exceeding the EPA Region 9 residential PRG/California-modified PRG concentration. This soil sampling was conducted in May 2008 in accordance with the Work Plan.	None of the reported concentrations of PAHs exceeded EPA Region 9 residential soil PRGs. Benzo(k)fluoranthene was reported at a maximum concentration of 450 µg/kg at the bottom of the excavation at location DSS12, which exceeded the California-modified residential soil PRG of 380 µg/kg, but is less than the EPA Region 9 residential soil PRG of 6,215 µg/kg. With the exception of this location, PAHs at all other locations were below their respective EPA Region 9 or California-modified residential soil PRGs. The soil sample was collected at the edge of the excavation and may have contained remnants of the waste petroleum, waste oil and other liquid wastes (potentially containing PCBs) which were applied to unpaved areas along the edges of the runways for dust suppression and control of vegetation. Therefore, the PAH results from location DSS12 are assessed to be an isolated exceedance. The other samples collected at this PRL were less than the EPA Region 9 or California-modified residential soil PRGs suggesting this concentration is localized at location DSS12 and is not indicative of a release. The cumulative carcinogenic risk corresponding to a benzo(a)pyrene equivalent EPC value of 66.6 µg/kg is $1x10^{-6}$. Specifically, the EPC for benzo(k)fluoranthene was 195.5 µg/kg which is less than the California-modified and EPA Region 9 residential soil PRG value of 380 µg/kg and 6,215 µg/kg, respectively. The computed carcinogenic risk is approximately equal to the lower bound of the EPA-established risk management range of 10^{-6} to 10^{-4}.	No Further Investigation

5. References

Bechtel National, Inc. (BNI). 1996a. *Final Technical Memorandum, Background and Reference Levels, Remedial Investigations, Marine Corps Air Station El Toro, California.* San Diego, CA: NAVFAC EFD SOUTHWEST.

———.1996b. *Final Report, Anthropogenic PAH Reference-Level Study, MCAS El Toro, California.* San Diego, California. July.

Earth Tech, Inc (Earth Tech). 2005a. *Summary Report for Group I Potential Release Locations, Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. February.

_____. 2005b. *Summary Report for Group II Potential Release Locations, Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. March.

_____. 2005c. *Summary Report for Group III Potential Release Locations, Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. October.

_____. 2008a. *Final Site Inspection Work Plan, Potential Release Locations, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. May.

_____. 2008b. *Final Summary Report for Group IV Potential Release Locations, Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. July.

_____. 2008c. *Draft Summary Report for Group V Potential Release Locations, Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. July.

Environmental Protection Agency (EPA), United States. 2002. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites.* Office of Emergency and Remedial Response. OSWER 9285.6-10. Washington, D.C. December.

———. 2004a. *EPA Region 9 PRGs* [Preliminary Remediation Goals] *Tables.* San Francisco, CA. October.

———. 2004b.*SW-846 On-Line, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm. Office of Solid Waste.

———. 2006. *Guidance for the Data Quality Objectives Process. EPA QA/G-4.* EPA/240/B-06/001. Office of Environmental Information. August.

Interstate Technology and Regulatory Council (ITRC). 2003. *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges.* January.

Naval Facilities Engineering Command Southwest (NAVFAC SW). 2003. *Final Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* San Diego, CA. September.

Attachment 1
Summary Report
PRL 296

Summary Report for PRL 296, Site Inspection

FORMER MARINE CORPS AIR STATION EL TORO, CALIFORNIA

October 2008

Prepared for:
Base Realignment and Closure
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San Diego, California

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Prepared under:
Naval Facilities Engineering Command
Contract Number N62742-03-D-1837
Contract Task Order 0032
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APPENDICES

ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
BNI	Bechtel National, Inc.
EPA	Environmental Protection Agency
EPC	exposure point concentration
HI	hazard index
ID	identification
IRP	Installation Restoration Program
LOC	location of concern
MCAS	Marine Corps Air Station
NAVFAC SW	Naval Facilities Engineering Command Southwest
mg/kg	milligrams per kilogram
pH	negative logarithm of hydrogen ion concentration
PRG	preliminary remediation goal
PRL	potential release location
RWQCB	Regional Water Quality Control Board, Santa Ana Region
SI	Site Inspection
TPH	total petroleum hydrocarbons
UCL	upper confidence limit
UJ	indicates the compound or analyte was analyzed for but was not detected; and the sample detection limit is an estimated value
UST	underground storage tank
VOC	volatile organic compound
X	analysis was performed for the specified analyte

1. Background

Potential Release Location (PRL) 296 is associated with Building 296, located in the southwest quadrant of former Marine Corps Air Station (MCAS) El Toro, California (Figure 1). The building was listed as A and R Hangar in the 1948 and 1949 Station lists; and as A and R Hangar No. 2 in the 1950 and 1954 Station lists. The facility description was Hangar in the 1958 list; Maintenance Hangar/Aircraft Ground Support Equipment Shop/Engine Shop in the 1973 list; and as Ground Support Equipment Shop in the 1997 list. The last known description was Maintenance Hangar OH Space, Transformer Room, Boiler Room, Armory, Storage, and Maintenance Hangar. Figure 2 shows the plan of Building 296 and the surrounding area.

Activities known to have taken place at this facility include metal plating, degreasing and equipment cleaning, and painting. The building included the following shops: Paint, Machine, Plastic, Oxygen, Propeller, Dope, and a Paint and Dope Mixing Room. Assorted pits, sumps, and industrial sinks associated with these activities were also present. Historical features within Building 296 include an abrasive blast unit, parts cleaning tanks, portable abrasive blast, recycling units, a salt bath furnace, a heavy-duty furnace, and a dispatch oven.

One location of concern (LOC), previously associated with this site, has already been closed, and is presented in Table 1.

Building 296 was extensively investigated as a potential source of volatile organic compound (VOC) contamination during Phase I and II remedial investigations at Installation Restoration Program (IRP) Site 24 (Bechtel National, Inc. [BNI] 1997). These investigations included a review of floor plans for Building 296 to determine locations where solvents may have been used (e.g., paint shops and degreaser pits), and to identify storm drain and industrial waste sewer line tie-ins and discharge points. Additionally, soil gas and soil sampling were conducted at various locations within the building to assess the nature and extent of vadose zone VOC and/or total petroleum hydrocarbons (TPH) contamination. Subsequent to these investigations, soil vapor extraction was conducted in an area encompassing Building 296 to remediate VOC contamination in the vadose zone of IRP Site 24 (Earth Tech 2002). This remedial action has been completed and a closure report has been approved by the regulatory agencies. VOCs and TPH at Building 296 have been adequately investigated and addressed by the IRP Site 24 remedial action for the vadose zone source area and as part of the Underground Storage Tank (UST) program. Consequently, the work areas within and in the vicinity of Building 296, including former degreaser pits, degreaser tanks, paint spray booths, and paint and dope rooms, do not need to be further investigated for releases of VOCs and TPH.

April 2005 Soil Sampling. Based on the issues and concerns discussed below which were identified during the records review, previous investigations, and visual site inspections conducted in 2002 in support of the 2003 Environmental Baseline Survey (Naval Facilities Engineering Command Southwest [NAVFAC SW] 2003), and in 2004 as part of supplemental site reconnaissance; soil sampling was conducted for PRL 296 in April 2005 as discussed in the Group III PRL package submitted for regulatory review in October 2005 (Earth Tech 2005).

- The locations of the former Paint Room, Paint Spray Booths, Paint and Dope Mixing Room, Anodizing Pit, a Pipe Trench, and Pit No. 5 were not investigated for potential releases of paint- and anodizing-related metals to the environment during previous investigations at IRP Site 24. Further investigation was recommended.
- VOCs were detected in shallow soil samples collected adjacent to Degreaser Pit No. 4. This was indicative of a release from the pit, but the area was not investigated for potential releases of metals to the environment. Further investigation was recommended.

- The former locations of Nickel-Cadmium and Lead-Acid Battery Shops were not investigated for potential releases of battery-related metals and acids to the environment during previous investigations at IRP Site 24. Further investigation was recommended.

Thus, a sampling program was conducted in April 2005 to assess whether a release of hazardous substances or pollutants from these specific operations had occurred. Eleven soil samples were collected from nine boreholes (HA1 through HA9) at depths ranging from 1-foot to 10 feet below ground surface (bgs). These samples were analyzed for metals (cadmium, chromium, cobalt, copper, lead, mercury, nickel, silver, and zinc), cyanide, and pH.

The pH values indicate that the soil is slightly basic and no release of acid has taken place in the vicinity of the sampling locations. Cyanide was not detected above the laboratory reporting limit. Of the metals analyzed (cadmium, chromium, cobalt, copper, lead, mercury, nickel, silver, and zinc), lead, reported at a concentration of 155 milligrams per kilogram (mg/kg) in the soil sample collected at location HA2 at 10 feet bgs (adjacent to Anodizing Pit No. 2), exceeded the California-modified residential preliminary remediation goal (PRG) of 150 mg/kg. Lead was reported at a concentration of 75.3 mg/kg in the soil sample collected at location HA2 at 5 feet bgs, which is greater than the MCAS El Toro background value (BNI 1996) of 15.1 mg/kg. None of the reported metals except cobalt, copper, and lead exceeded their respective MCAS El Toro background values. The analytical results for these soil samples are presented in Appendix A and the Summary Report for Group III PRLs (Earth Tech 2005). The soil sample locations are shown on Figure 2.

2. Site Inspection Soil Sampling Objectives

Environmental Protection Agency (EPA) concurred with the recommendation for no further action for PRL 296 in a letter dated 3 November 2005. However, the California Department of Toxic Substances Control requested additional investigation to characterize the distribution of lead at location HA2 in a letter dated 3 February 2006.

Therefore, a judgmental sampling program based on previous sampling results was conducted to characterize the distribution of lead in soil at PRL 296. A summary of Site Inspection (SI) soil sampling activities is presented in Section 3, and the results are presented in Section 4.

3. Sampling and Analysis Summary

Soil sampling was conducted for PRL 296 in May 2008 in accordance with the *Final Site Inspection Work Plan, Potential Release Locations* (Work Plan) (Earth Tech 2008). The sample locations are shown on Figure 2 and a summary of sampling and analyses performed is provided in Table 2.

One soil sample was collected at location HA2 at a depth of 15 feet bgs to assess the vertical distribution of lead where a previous detection above the California-modified residential PRG has been reported (155 mg/kg at 10 feet bgs).

Soil samples were collected from four boreholes (HA10, HA11, HA12, and HA13) to assess the distribution of lead in the vicinity of HA2. At each location, the samples were collected at three depths: 5 feet bgs, 10 feet bgs, and 15 feet bgs using direct push equipment, and analyzed for lead. The exception was location HA10 where two samples were collected from a depth of 5 feet bgs and 7.5 feet bgs (instead of 5 feet, 10 feet, and 15 bgs). Two attempts were made to collect the deeper soil sample at location HA10 and an adjacent borehole, however obstruction at 7.5 feet bgs at both boreholes prevented the collection of the 15-foot sample.

4. Investigation Results

This section presents analytical results and discusses the results of data evaluation and risk screening. The analytical results for the samples collected at PRL 296 along with the screening level of lead which is the California-modified residential PRG per the Work Plan are presented in Table 3. Appendix B presents the land surveying data.

4.1 Analytical Results and Quality Assurance

One result, LW003 (borehole location HA10 at 7.5 feet bgs), was determined to be a detectable concentration due to laboratory contamination and therefore was revised to a non-detect. The value was below the target action limit and the conclusions and recommendations are not altered.

4.2 Results Evaluation and Risk Screening

4.2.1 Results Evaluation

None of the additional soil samples collected in the vicinity of location HA2 contained lead concentrations exceeding it's screening level i.e., California-modified residential PRG of 150 mg/kg. These results indicate that the lead concentration reported at location HA2 in 2005 is highly localized and is not indicative of a significant release.

Evidence to support this conclusion includes the absence of any other elevated metal concentrations at HA2 during the previous soil sampling in 2005, which would likely be present if a release of contaminants due to processing activities had occurred. Further, samples collected at other process pits with similar activities at Building 296 during the 2005 sampling did not have elevated concentrations of lead or other metals either, as might be expected if a release due to processing operations had occurred. Therefore, it does not appear that the single detection of lead above the California-modified residential PRG during the 2005 investigation is indicative of wide-spread release.

4.2.2 Risk Screening

Risk screening was performed to evaluate risks associated with potential exposures to reported analytes in the soil at PRL 296. The methodology for risk screening is presented in Section 3.3 of the main text of the SI Report and results are presented in Table 4.

The twenty three soil samples analyzed at PRL 296 (including the 2005 and 2008 investigations) have an average lead concentration of 15.7 mg/kg. The first step in risk screening of lead was to estimate a reasonable maximum exposure point concentration (EPC) for lead, which corresponds to the highest exposure that is reasonably expected to occur at the site. The value of reasonable maximum EPC was estimated for lead by calculating the 95 percent upper confidence limit (UCL) of the mean concentration, and comparing it with its maximum reported concentration; the lesser of the two values (95 percent UCL and maximum detected concentration) was then used as the reasonable maximum EPC for lead. The 95 percent UCL of the mean concentration of lead at PRL 296 was estimated using the ProUCL program that is based on the EPA (2002) guidance document. Lead concentrations do not follow lognormal distribution; therefore, the 99% Chebyshev UCL method described in the EPA guidance document was used for the 95-percent-UCL calculation. The 95 percent UCL of the mean concentration of lead using this method was estimated to be 89.7 mg/kg, which is less than the maximum reported concentration of 155 mg/kg. Therefore, the value of reasonable maximum EPC for lead was estimated to be 89.7 mg/kg, which is less than the California-modified residential soil PRG of 150 mg/kg.

The cumulative maximum carcinogenic risk (including results from the 2005 investigations) due to potential exposure to maximum reported concentrations of constituents analyzed at PRL 296 is $8x10^{-8}$, which is less than the EPA point of departure risk level of 10^{-6}.

The cumulative noncancer hazard associated with potential exposure to maximum reported concentrations of metals is expressed as a hazard index (HI) of 0.05, which is less than the target HI of 1. A hazard quotient for lead could not be determined because the PRGs for lead were developed using the blood-lead levels and a reference dose is not available.

5. Conclusions and Recommendations

The primary objective of investigations conducted at PRL 296 was to assess whether a significant release of hazardous substances or pollutants into the environment has occurred. A review of available records, visual site inspections, and soil sampling were conducted for this assessment. One soil sample collected in 2005 contained lead concentration in excess of the California-modified residential PRG. Subsequent samples were collected in 2008 to characterize the distribution of lead. The reported concentrations of lead in all subsequent samples were less than the California-modified residential PRG, and are not indicative of a significant release. This conclusion is supported by the absence of other metals at elevated concentrations in the sample from location HA2 and the absence of elevated concentrations of all metal analytes at other sample locations at PRL 296 during the previous soil sampling conducted in 2005.

The estimated cancer risk at PRL 296 is less than the EPA point of departure value of 10^{-6} and the noncancer hazard at this PRL is less than the target HI of 1. Based on these observations and results, no further investigation is recommended for PRL 296.

6. References

Bechtel National, Inc. (BNI). 1996. *Final Technical Memorandum, Background and Reference Levels, Remedial Investigations, Marine Corps Air Station El Toro, California.* San Diego, CA: NAVFAC EFD SOUTHWEST.

———. 1997. *Draft Final Phase II Remedial Investigation Report, Operable Unit 2A – Site 24, Marine Corps Air Station El Toro, California.* March.

Earth Tech, Inc. (Earth Tech). 2002. *Draft Final Site Closure Report Vadose Zone Remediation IRP Site 24, Volatile Organic Compounds Source Area, Former MCAS-El Toro, California.* Honolulu, HI. June.

_____. 2005. *Summary Report for Group III Potential Release Locations, Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. October.

_____. 2008. *Final Site Inspection Work Plan, Potential Release Locations, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. May.

Environmental Protection Agency (EPA), United States. 2002. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites.* Office of Emergency and Remedial Response. OSWER 9285.6-10. Washington, D.C. December.

———. 2004a. *EPA Region 9 PRGs* [Preliminary Remediation Goals] *Tables.* San Francisco, CA. October.

———. 2004b. *SW-846 On-Line, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm. Office of Solid Waste.

———. 2006. *Guidance for the Data Quality Objectives Process. EPA QA/G-4.* EPA/240/B-06/001. Office of Environmental Information. August.

MCAS. 1971. Modifications, Repairs and Equipment Installation in Buildings 295, 296, and 315; Building 296: First Floor North Area; New and Modified Floor Plan. NAVFAC Drawing No. 6004955. El Toro (Santa Ana), CA. May.

———. 1971. Modifications, Repairs and Equipment Installation in Buildings 295, 296, and 315; Building 296: First Floor South Area; New and Modified Floor Plan. NAVFAC Drawing No. 6004959. El Toro (Santa Ana), CA. May.

———. 1989. Repairs to Various Buildings (MET 624 and TU 625); Paint Spray Booth Plan and Section Building # 296. NAVFAC Drawing No.: 6272267. September.

Naval Facilities Engineering Command Southwest (NAVFAC SW). 2003. *Final Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* San Diego, CA. September.

Tables

Table 1: Former Locations of Concern – PRL 296

LOC Name	Description	Action	Status	Concurrence
UST 296	6,000-gallon diesel UST	Removed	No Further Action	RWQCB, 11 April 2007

Notes:

LOC = location of concern
PRL = potential release location
RWQCB = Regional Water Quality Control Board, Santa Ana Region
UST = underground storage tank

Table 2: Soil Sampling and Analyses Summary – PRL 296

Sample Location	EPA ID	Sample Depth (feet bgs)	Actual Depth in the field if different than in the Final SI Work Plan (Earth Tech 2008) (feet bgs)	Sampling Technique	Analyte Group and Analytical Method[a]
					Lead 6010B
HA2	LW001	15		Direct Push	X
HA10	LW002	5		Direct Push	X
HA10	LW003	10	7.5 – Refusal*	Direct Push	X
HA10	LW004	15	Sample Not Collected	Direct Push	X
HA11	LW005	5		Direct Push	X
HA11	LW006	10		Direct Push	X
HA11	LW007	15		Direct Push	X
HA12	LW008	5		Direct Push	X
HA12	LW009	10		Direct Push	X
HA12	LW010	15		Direct Push	X
HA13	LW011	5		Direct Push	X
HA13	LW012	10		Direct Push	X
HA13	LW013	15		Direct Push	X

Notes:
* Refusal occurred at location HA10 and at alternate location at 7.5 feet bgs. Samples not collected at 10 and 15 feet bgs.
[a] Analysis was in general accordance with the listed methods provided in EPA Publication SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.

bgs below ground surface
EPA Environmental Protection Agency
ID identification
PRL potential release location
SI Site Inspection
X analysis was performed for the specified analyte

Table 3: Analytical Results Summary – PRL 296

EPA ID	Sampling Location/ID Number	Sample Depth (feet bgs)	Lead Concentration (mg/kg) (150 mg/kg)[a] (15.1 mg/kg)[b]
LW001	HA2	15	3.7
LW002	HA10	5	3.9
LW003	HA10	7.5	0.26 UJ
LW005	HA11	5	*60.4*
LW006	HA11	10	2.2
LW007	HA11	15	4.1
LW008	HA12	5	4.4
LW009	HA12	10	3.8
LW010	HA12	15	3.8
LW011	HA13	5	7.5
LW012	HA13	10	4.9
LW013	HA13	15	3.8

Notes:
Concentrations with italic underline indicate values greater than the former MCAS El Toro background, but less than the screening level i.e. the California-modified residential PRG (EPA 2004a).
[a] Screening Level as per the *Final SI Work Plan* (Earth Tech 2008), which is the California-modified residential PRG (EPA 2004a).
[b] MCAS El Toro Background value (BNI 1996).

bgs	below ground surface
BNI	Bechtel National, Inc.
EPA	Environmental Protection Agency
ID	identification
MCAS	Marine Corps Air Station
mg/kg	milligrams per kilogram
PRG	preliminary remediation goal
PRL	potential release location
SI	Site Inspection
UJ	indicates the compound or analyte was analyzed for but was not detected; and the sample detection limit is an estimated value

Table 4: Risk Screening Results - PRL 296

Constituent	MCAS El Toro Background Concentrations (95th Quantile)[a]	Resonable Maximum EPC*	Carcinogenic PRG[b]	Noncarcinogenic PRG[b]	Risk Corresponding to Reasonable Maximum EPC			
					Carcinogenic		Noncarcinogenic	
					Excess Cancer Risk[c]	Percent Contribution to Cancer Risk[d]	HI[e]	Percent Contribution to Noncancer Hazard[d]
Metals (mg/kg)								
Cadmium	2.35	1	1.4E+03	3.7E+01	7.1E-10	0.9%	2.7E-02	54.1%
Chromium	26.9	14.7	2.1E+02	–	7.0E-08	88.6%	–	–
Cobalt	6.98	7.5	9.0E+02	1.4E+03	8.3E-09	10.5%	5.4E-03	10.9%
Copper	10.5	10.9	–	3.1E+03	–	–	3.5E-03	7.0%
Lead[f]	15.1	89.7	–	1.5E+02	–	–	–	–
Mercury	0.22	0.13	–	2.3E+01	–	–	5.5E-03	11.1%
Nickel	15.3	9.1	–	1.6E+03	–	–	5.8E-03	11.7%
Zinc	77.9	61.8	–	2.3E+04	–	–	2.6E-03	5.3%
			Cumulative Maximum Risk		**8.E-08**		**0.05**	

Notes:

*The maximum reported concentrations of analytes have been used as resonable maximum EPC, except for lead for which the 95% UCL concentration has been estimated using the ProUCL Version 4.

[a] Source: BNI 1996

[b] United States EPA Region 9 PRGs (2004a)

[c] Excess cancer risk = 1E-06 x (Maximum EPC/Carcinogenic PRG)

[d] With respect to cumulative excess cancer risk or hazard index

[e] HI = Maximum EPC / Noncarcinogenic PRG

[f] Analytical results for lead were compared to California-modified PRG (2004a) because it is significantly more protective than the corresponding EPA Region 9 PRG

An hazard quotient for lead could not be determined because the PRGs for lead were developed using the blood-lead levels and a reference dose is not available

– = value does not exist

BNI = Bechtel National, Inc.

EPA = Environmental Protection Agency

EPC = exposure point concentration

HI = hazard index

MCAS = Marine Corps Air Station

mg/kg = milligrams per kilogram

PRG = preliminary remediation goal

PRL = potential release location

Figures

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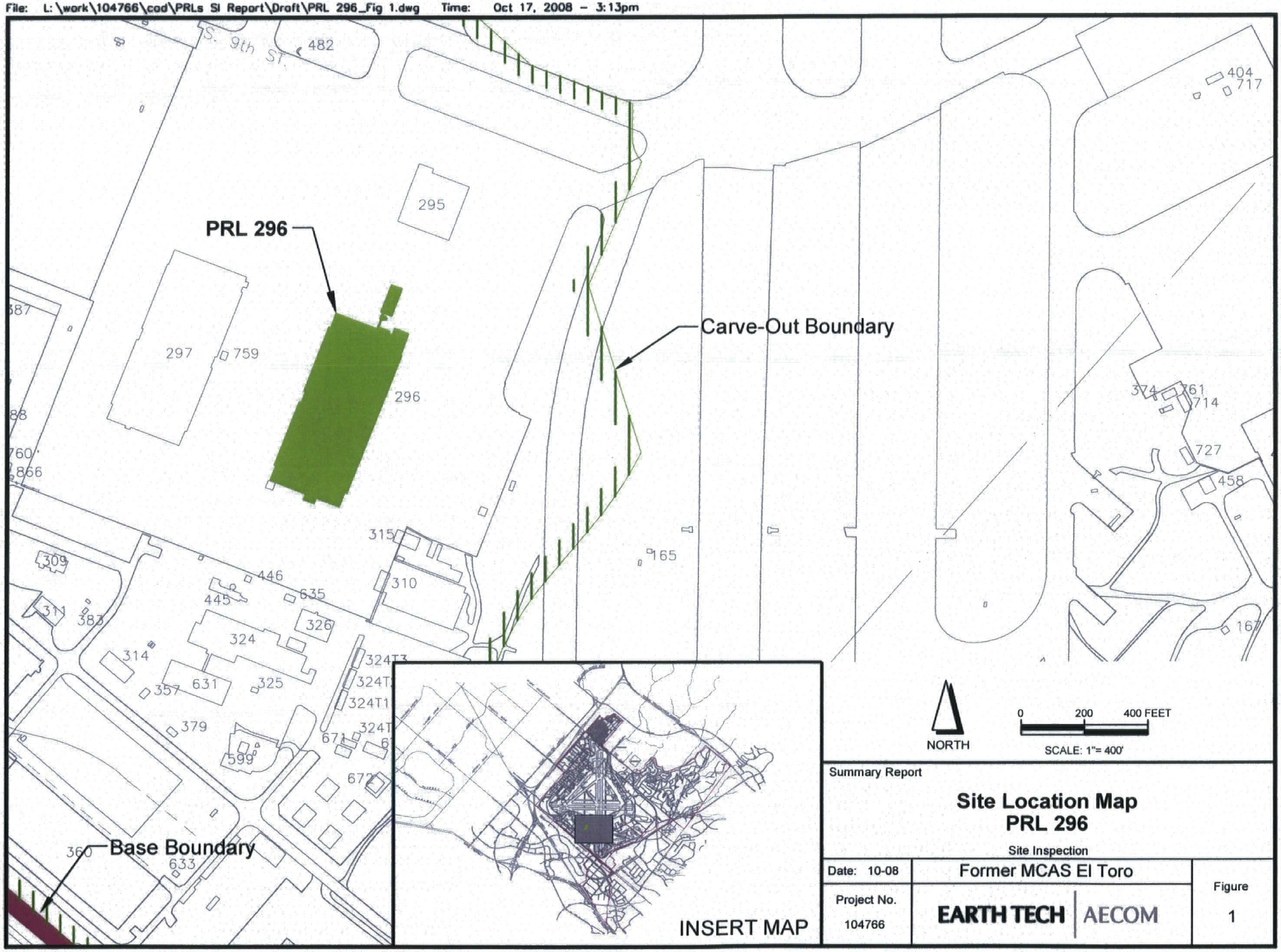


Summary Report

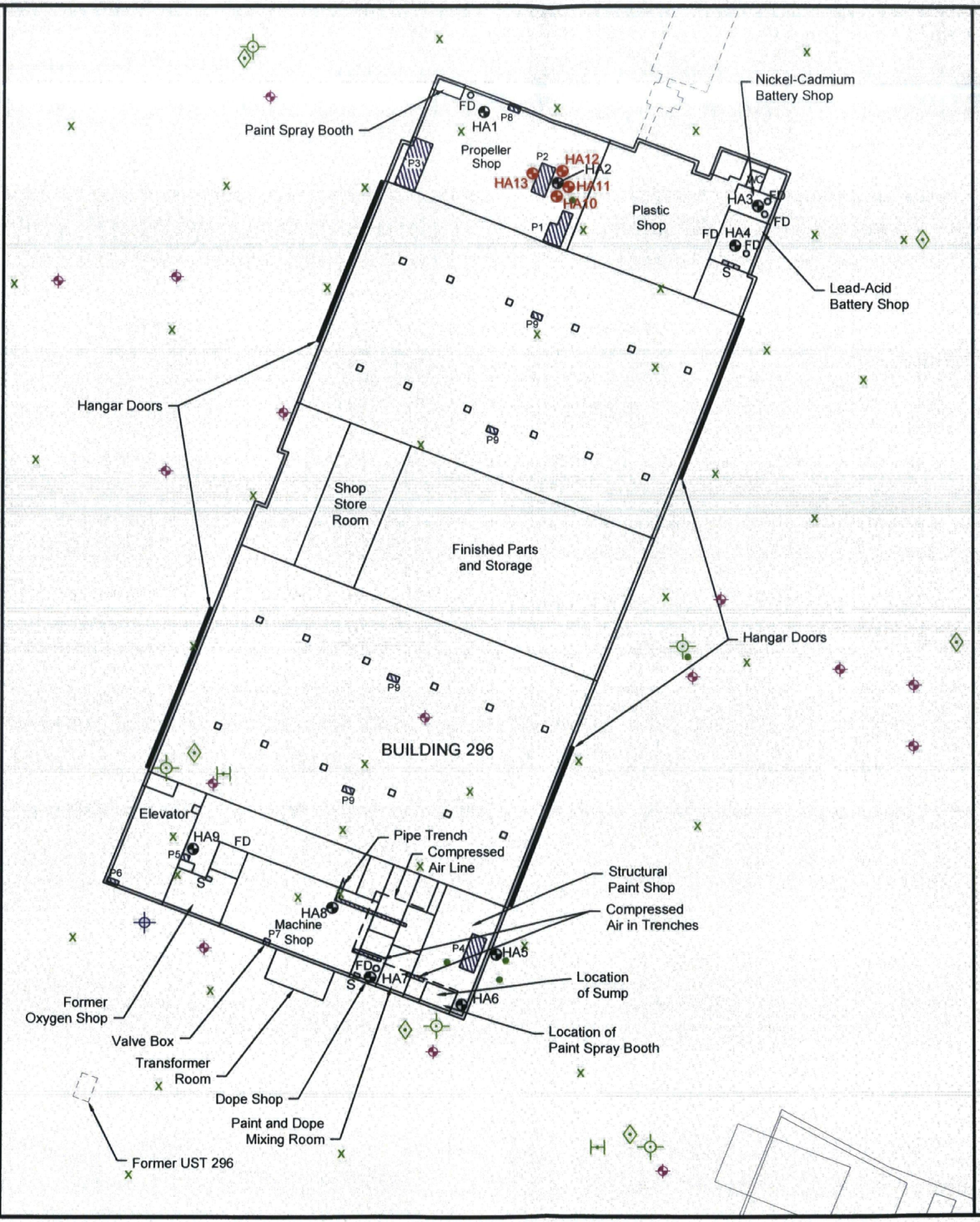
Site Location Map
PRL 296

Site Inspection

Date: 10-08	Former MCAS El Toro	Figure 1
Project No. 104766	EARTH TECH | AECOM	

Former Paint and Dope Room with Remnants of Piping (Facing South)

Lead-Acid Battery Shop North East Corner (Facing South)



LEGEND:

- Former Process Pit or Trench
- Approximate 1991 Soil Boring Locations (Sample Depth: Below the Tank; Analytes: TPH and BTEX)
- Approximate Phase II RI Soil Boring Location; Completed as Soil Vapor Extraction Well (Bechtel 1997) (Sample Depth: 85 to 129 ft bgs; Analytes: VOCs)
- Approximate Phase II RI Hand Auger Location (Bechtel 1997) (Sample Depth: 2.5 to 15 ft bgs; Analytes: VOCs)
- Approximate Phase I RI Soil Gas Location (Bechtel 1997) (Sample Depth: 30 ft bgs; Analytes: VOCs and TPH)
- Approximate Phase II RI CPT Adjacent to Soil Gas Sample Location, Symbol Implies Nearby 24SG1 Soil Gas Sample Location (Bechtel 1997) (Sample Depth: 30 ft bgs to Groundwater; Lithology Only)
- Approximate Phase II RI CPT Adjacent to Hydropunch Location, Symbol Implies Nearby Hydropunch Location (Bechtel 1997) (Sample Depth: 85 to 120 ft bgs and 300 to 350 ft bgs; Groundwater Analytes: VOCs, SVOCs, and TPH)
- SVE Wells (Earth Tech 2002) (Total Depth: 71 to 105 ft bgs; Analytes: VOCs)
- HA6 Soil Sample Location (Earth Tech 2005) (Sample Depth: 1 to 10 ft bgs; Analytes: Metals, pH, and Cyanide)
- HA11 Soil Sample Location (Earth Tech 2008) (Sample Depth: 5 ft, 10 ft, and 15 ft bgs; Analytes: Lead). In addidtion, Soil Sample was Collected at 15 ft bg at Location HA2 and Analyzed for Lead. The Exception was Location HA10 where Two Samples were Collected from a Depth of 5 ft bgs and 7.5 ft bgs. Obstruction at Location HA10 and Adjacent Borehole at 7.5-feet Prevented the Collection of the 15-foot Sample.

Table 1: List of Process Pits in Building 296

Pit Number	Dimensions (feet)[1]	Hangar Area	Description
1	21 x 12 x 2.4	Propeller Shop	Degreaser Tank, Rinse Tanks
2	18 x 9 x 7.7	Propeller Shop	Anodizing Pit Tanks: Paint Strip, Alkali Soak, Alkali Rinse, Anodize, Anodize Rinse
3	20 x 1.5 x 7	Propeller Shop	Propeller Balancing Pits
4	18.5 x 11.7 x 7.3	Structural Paint Shop	Degreaser Pit
5	3 x 4.5 x 3	Oxygen Shop	Drained to Sewer
6	3 x 4.5 x 3	Utility Pit	Steam Supply Connections
7	3 x 4.5 x 3	Utility Pit	Condensate Valve Box
8	3 x 4.5 x 3	Utility Pit	Steam Supply Connections
9	3 x 4.5 x 3	Utility Pit	Compressed Air Distribution Pits

Notes:
1. Dimensions reported as length (in reference to building's longitudinal axis) by width by depth (deepest point) in feet. Dimensions are inside dimensions and do not include 8 to 10-inch walls and bottom slabs.

NORTH

0 40' 80 FEET

SCALE: 1"= 80'

Features and interior layout are approximate and may not be to scale

Summary Report

Site Plan
PRL 296

Site Inspection

Date: 10-08	Former MCAS El Toro	Figure
Project No. 104766	EARTH TECH | AECOM	2

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Appendix A
Previous Soil Sampling Results

Table A-1: Analytical Results Summary - PRL 296 - April 2005 Soil Sampling

Analyte	MCAS El Toro Background Concentrations (95th Quantile)[a]	Residential Soil PRG[b]	Sample Location	PRL296-HA1	PRL296-HA2	PRL296-HA2	PRL296-HA3	PRL296-HA4	PRL296-HA5	PRL296-HA5	PRL296-HA6	PRL296-HA7	PRL296-HA8	PRL296-HA9
			Sample Depth	1 feet bgs	5 feet bgs	10 feet bgs	1 feet bgs	1 feet bgs	5 feet bgs	10 feet bgs	4 feet bgs	3 feet bgs	3 feet bgs	5 feet bgs
			EPA ID	LJ377	LJ375	LJ376	LJ373	LJ374	LJ379	LJ380	LJ381	LJ382	LJ378	LJ385
Metals (mg/kg)														
Cadmium	2.35	3.7E+01		0.51	0.6	0.54	0.15	0.52	0.49	0.3	0.52	0.97	1	0.75
Chromium	26.9	2.1E+02		8.1	11.7	14.7	NA	NA	6.2	13.1	6.3	11.7	11.1	9.1
Cobalt	6.98	9.0E+02		5.5	NA	NA	NA	NA	3.5	*7.5*	3.1	5.8	5.2	4.2
Copper	10.5	3.1E+03		NA	7.9	*10.9*	NA	NA	NA	NA	NA	NA	NA	NA
Lead[c]	15.1	1.5E+02		2.1	*75.3*	**155**	5.6	5.7	1.6	2.4	1.5	3.7	2.7	3.1
Mercury	0.22	2.3E+01		0.085 J	NA	NA	NA	NA	0.07 J	0.083 J	0.053 J	0.12 J	0.066 J	0.13 J
Nickel	15.3	1.6E+03		NA	8.7	9.1	8.2	7.1	NA	NA	NA	NA	NA	NA
Silver	0.539	3.9E+02		NA	0.57 U	0.59 U	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	77.9	2.3E+04		NA	50.9	61.8	NA	NA	NA	NA	NA	NA	NA	NA
Others (mg/kg)														
Cyanide	–	–		NA	2.9 U	2.9 U	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry														
pH	–	–		NA	9.1	8.74	9.31	8.65	NA	NA	NA	NA	NA	NA

Notes

Concentrations in **bold** indicate values greater than the residential soil PRGs and the former MCAS El Toro background values

Concentrations with *italic underline* indicate values greater than the former MCAS El Toro background, but less than the residential soil PRGs

[a] Source: BNI 1996

[b] Analytical results were compared to EPA Region 9 PRGs (EPA 2004a)

[c] Analytical results for lead were compared to California-modified PRGs (EPA 2004a) since they are significantly more protective than the corresponding EPA Region 9 PRGs

– = value does not exist

bgs = below ground surface

BNI = Bechtel National, Inc.

EPA = Environmental Protection Agency

ID = identification

J = indicates an estimated value

MCAS = Marine Corps Air Station

mg/kg = milligrams per kilogram

NA = not analyzed

pH = negative logarithm of hydrogen ion concentration

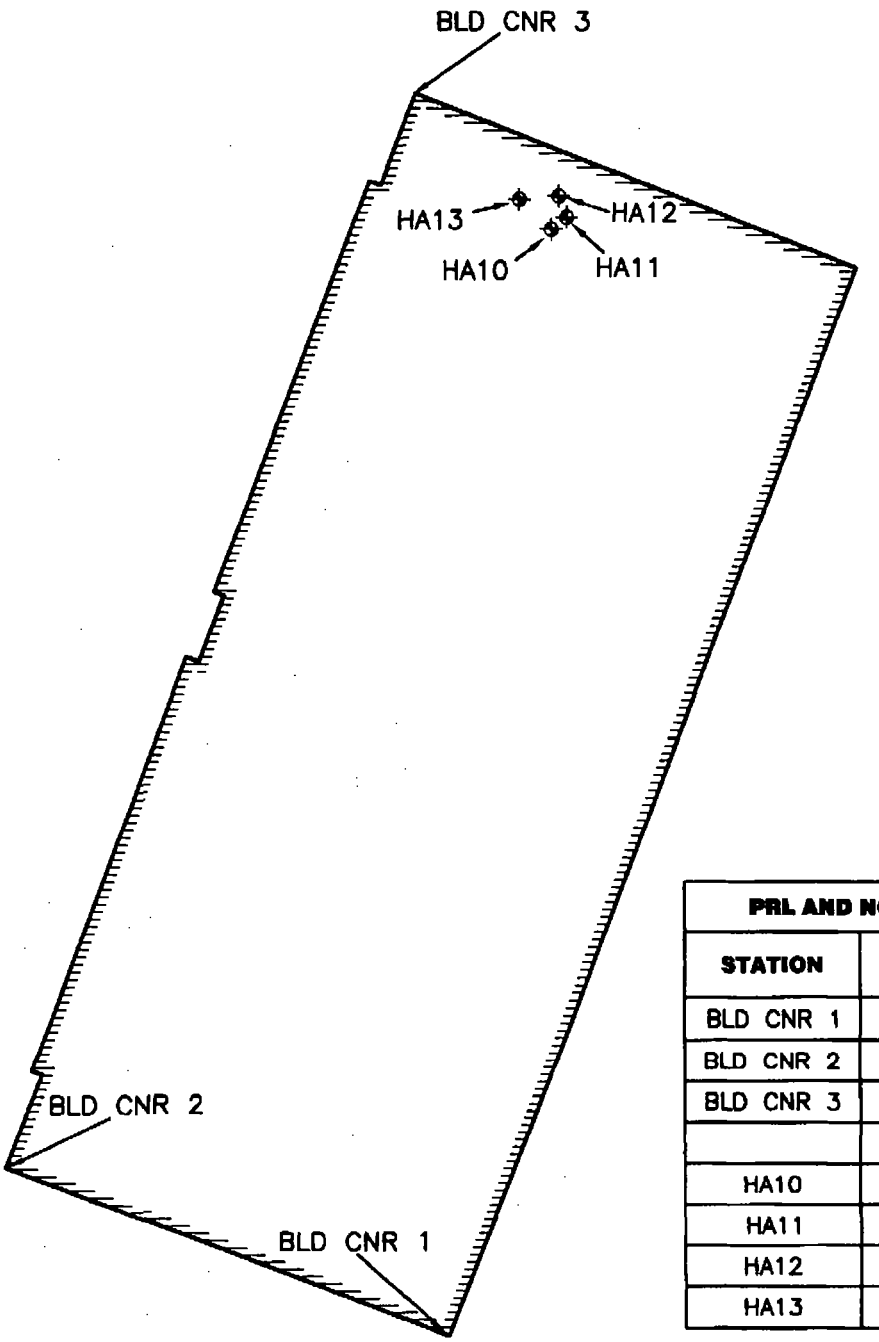
PRG = preliminary remediation goal

PRL = potential release location

U = indicates the compound or analyte was analyzed for but was not detected at or above the stated limit.

Appendix B
Land Surveying Data

PRL296-BLD296

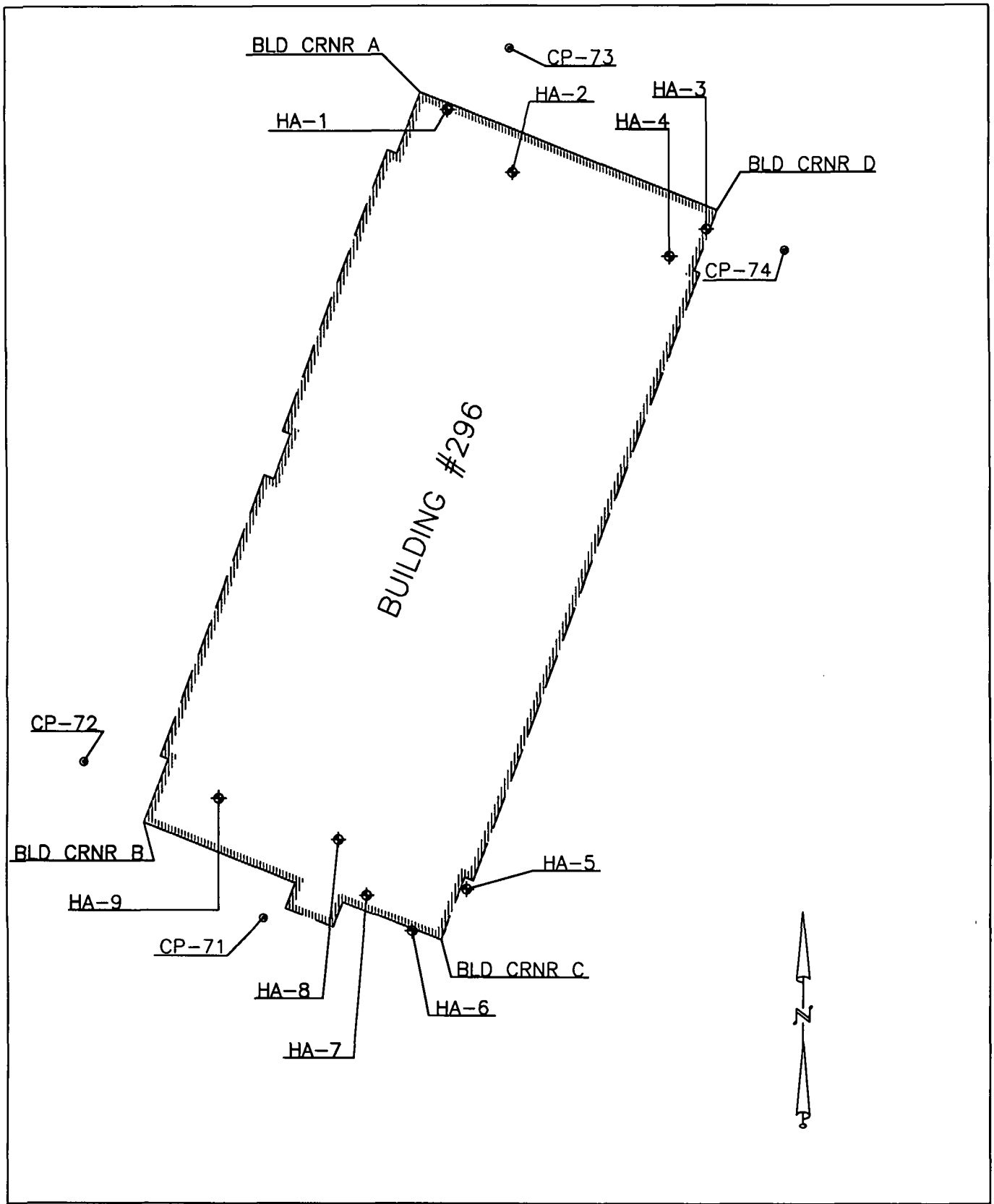


PRL AND NOTABLE FEATURES LOCATIONS			
STATION	NORTHINGS	EASTINGS	ELEV.
BLD CNR 1	2188265.15	6110281.80	292.31
BLD CNR 2	2188352.89	6110066.17	292.37
BLD CNR 3	2188895.80	6110277.82	292.40
HA10	2188827.16	6110347.00	292.42
HA11	2188833.20	6110354.88	295.45
HA12	2188843.87	6110350.70	292.43
HA13	2188842.08	6110330.59	292.47

DCA CIVIL ENGINEERING GROUP
17625 Crenshaw Blvd., Ste. 300
Torrance, California 90504
Tel: (310) 327-0018
Fax: (310)327-0175
www.dcacivileng.com

POTENTIAL RELEASE LOCATION SKETCH

SCALE: 1"= 90'	DATE: 05/30/2008
BY: ANK	JOB NO.: 04-1058-2227.000-1019



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Torrance, California 90504
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Fax: (310)327-0175
www.dcacivileng.com

POTENTIAL RELEASE LOCATION SKETCH
BUILDING #296

SCALE:	1"=100'	DATE:	06-06-05
BY:	JCL	JOB NO.:	04-1058-2227.000-535

BUILDING #296 PRL AND NOTABLE FEATURES LOCATIONS			
STATION	NORTHING	EASTING	ELEVATION
BLD CRNR A	2188895.80	6110277.81	
BLD CRNR B	2188352.89	6110066.17	
BLD CRNR C	2188265.15	6110291.80	
BLD CRNR D	2188807.78	6110503.50	
CP 71	2188281.53	6110157.31	291.81
CP 72	2188398.35	6110020.48	291.38
CP 73	2188928.57	6110345.59	291.69
CP 74	2188777.72	6110554.79	292.43
BLD 296-HA 1	2188882.81	6110298.15	292.52
BLD 296-HA 2	2188836.04	6110347.52	292.43
BLD 296-HA 3	2188793.69	6110495.15	293.11
BLD 296-HA 4	2188773.25	6110466.94	292.97
BLD 296-HA 5	2188303.51	6110311.00	292.21
BLD 296-HA 6	2188271.76	6110269.68	292.42
BLD 296-HA 7	2188299.06	6110235.87	292.74
BLD 296-HA 8	2188340.18	6110214.41	292.74
BLD 296-HA 9	2188370.90	6110122.97	292.81

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Torrance, California 90504
Tel: (310) 327-0018
Fax: (310)327-0175
www.dcacivileng.com

POTENTIAL RELEASE LOCATION SKETCH
BUILDING #296

SCALE: NONE	DATE: 06-06-05
BY: JCL	JOB NO.: 04-1058-2227.000-535

Attachment 2
Summary Report
PRL 297

Summary Report for PRL 297, Site Inspection

FORMER MARINE CORPS AIR STATION EL TORO, CALIFORNIA

October 2008

Prepared for:
Base Realignment and Closure
Program Management Office West
San Diego, California

Prepared by:
Earth Tech, Inc.
841 Bishop Street, Suite 500
Honolulu, HI 96813-3920

Prepared under:
Naval Facilities Engineering Command
Contract Number N62742-03-D-1837
Contract Task Order 0032
DCN: ET-1837-0032-0001

CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

AOC	area of concern
bgs	below ground surface
BNI	Bechtel National, Inc.
DTSC	Department of Toxic Substances Control
EPA	Environmental Protection Agency
EPC	exposure point concentration
FA	further action
HI	hazard index
ID	identification
J	indicates an estimated value
JEG	Jacobs Engineering Group
IRP	Installation Restoration Program
LOC	location of concern
MCAS	Marine Corps Air Station
mg/kg	milligrams per kilogram
NAVFAC SW	Naval Facilities Engineering Command Southwest
NFA	no further action
OCHCA	Orange County Health Care Agency
OWS	oil-water separator
PRG	preliminary remediation goal
pH	negative logarithm of hydrogen ion concentration
PRL	potential release location
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
SI	Site Inspection
SWMU	Solid Waste Management Area
TAA	temporary accumulation area
TPH	total petroleum hydrocarbons
UCL	upper confidence limit
UST	underground storage tank
VOC	volatile organic compound
X	analysis was performed for the specified analyte

1. Background

Potential Release Location (PRL) 297 is associated with Building 297 located in the southwest quadrant of the former Marine Corps Air Station (MCAS) El Toro, California (Figure 1). The building was listed as A and R Hangar in the 1948 and 1949 Station lists; A and R Hangar No. 3 in the 1950 and 1954 Station lists; and as Hangar in the 1958 list. The facility description was Maintenance Hangar, Avionics Shop/Airframe Shop, Parachute and Survival Equipment, GRO in the 1973 list; and as Maintenance Hangar OH Space in the 1997 list. The last known description was Maintenance Hangar 02 Space, Maintenance Hangar 01 Space, Maintenance Hangar OH Space, Boiler Room. Figure 2 shows the plan of Building 297 and the surrounding area.

Activities known to have taken place at this facility include metal plating, degreasing, and equipment cleaning. The building included the following shops: Machine, Woodworking, Tank, Heat Treat, Metal, Tubing, Welding, Plating and Anodizing, and Wing. Assorted pits, sumps, and industrial sinks associated with these activities were also present.

Ten locations of concern (LOCs), previously associated with this site, four of which have already been closed, are presented in Table 1.

Building 297 was extensively investigated as a potential source of volatile organic compound (VOC) contamination during Phase I and II remedial investigations at Installation Restoration Program (IRP) Site 24 (Bechtel National, Inc. [BNI] 1997). These investigations included review of floor plans for Building 297, to determine locations where solvents may have been used (e.g., paint shops and degreaser pits), and to identify storm drain and industrial waste sewer line tie-ins and discharge points. Additionally, soil gas and soil sampling were conducted at various locations within the building to assess the nature and extent of vadose zone VOC and/or total petroleum hydrocarbons (TPH) contamination. Subsequent to these investigations, soil vapor extraction was conducted in an area encompassing Building 297 to remediate the VOC contamination in the vadose zone of IRP Site 24 (Earth Tech 2002). This remedial action was completed and a closure report was approved by the regulatory agencies. VOCs and TPH at Building 297 have been adequately investigated and addressed by the IRP Site 24 remedial action for the vadose zone source area and as part of the Underground Storage Tank (UST) program. Consequently, the work areas within and in the vicinity of Building 297, including degreaser pits, degreaser tanks, stripping tanks, the plating and anodizing shop and wash rack, do not need to be further investigated for releases of VOCs and TPH.

April 2005 Soil Sampling. Based on the issues and concerns discussed below which were identified during the records review, previous investigations, and visual site inspections conducted in 2002 in support of the 2003 Environmental Baseline Survey (Naval Facilities Engineering Command Southwest [NAVFAC SW] 2003), and in 2004 as part of supplemental site reconnaissance; soil sampling was conducted for PRL 297 in April 2005 as discussed in the Group III PRL package submitted for regulatory review in October 2005 (Earth Tech 2005).

- The locations of former processing pits in the Tank and Heat Treat Shops were not investigated for potential releases of metals to the environment during previous investigations at IRP Site 24. Further investigation was recommended.
- VOCs were detected in shallow soil samples collected adjacent to the Process Pit No. 8 in the Plating and Anodizing Shop, indicating a release from the pit, but the area was not investigated for potential releases of metals to the environment. Further investigation was recommended.

- A Flammable Materials Storage Room (formerly an elevator room) with exposed soil was identified in the southern part of Building 297. Further investigation was recommended.
- The location of the X-Ray Operations room within Building 297 was not investigated for releases of metals to the environment during previous investigations at IRP Site 24. Further investigation was recommended.

Thus, a sampling program was conducted in April 2005 to assess whether a release of hazardous substances or pollutants from these specific operations had occurred. Twenty four soil samples were collected from fourteen boreholes (HA1 through HA14) at depths ranging from 1-foot to 16 feet below ground surface (bgs). These samples were analyzed for metals (cadmium, chromium, cobalt, copper, lead, nickel, silver, and zinc), cyanide, and pH.

The pH values ranged from 4.99 to 10.3 with the majority falling between 7.4 and 9.2, representing neutral to basic conditions. The value of 4.99, representing acidic conditions, was reported at location HA12, Flammable Materials Storage Room. The value of 10.3, representing basic conditions, was reported at location HA14, inside the plating and anodizing pit.

Cyanide was not detected above the laboratory reporting limit. None of the metals (cadmium, chromium, copper, lead, nickel, silver, and zinc) exceeded their respective residential preliminary remediation goal (PRG) (Environmental Protection Agency [EPA] 2004a) values, except lead which exceeded the California-modified residential PRG of 150 milligrams per kilogram (mg/kg) in one sample. Lead was reported at a concentration of 214 mg/kg in the soil sample collected at location HA1 at 4 feet bgs in the Tank Shop, and at a concentration of 140 mg/kg in the soil sample collected at location HA11 at 10 feet bgs. The analytical results for these soil samples are presented in Appendix A and the Summary Report for Group III PRLs (Earth Tech 2005). The sample locations are shown on Figure 2.

2. Site Inspection Soil Sampling Objectives

EPA concurred with the recommendation for no further action for PRL 297 in a letter dated 5 January 2006. However, the California Department of Toxic Substances Control (DTSC) requested additional investigation to characterize the distribution of lead at locations HA1 and HA11 in a letter dated 3 February 2006.

Therefore, a judgmental sampling program based on previous sampling results was conducted to characterize the distribution of lead in soil at PRL 297. A summary of Site Inspection (SI) soil sampling activities is presented in Section 3, and the results are presented in Section 4.

3. Sampling and Analysis Summary

Soil sampling was conducted for PRL 297 in May 2008 in accordance with the *Final Site Inspection Work Plan, Potential Release Locations* (Work Plan) (Earth Tech 2008). The sample locations are shown on Figure 2 and a summary of sampling and analyses performed is provided in Table 2.

One soil sample was collected at location HA1 at a depth of 10 feet bgs to assess the vertical distribution of lead where a previous detection above the California-modified residential PRG has been reported.

Soil samples were collected from four boreholes (HA15, HA16, HA17, and HA21) to assess the distribution of lead in the vicinity of HA1. At each location, the samples were collected at two depths: 4 feet bgs and 10 feet bgs using direct push equipment, and analyzed for lead. The exception

were locations HA17 and HA21 where one sample each was collected from a depth of 3.5 feet bgs (instead of 4 feet bgs and 10 feet bgs). Two attempts were made to collect the deeper soil samples at locations HA17 and HA21 and their adjacent boreholes; however obstruction at 3.5 feet bgs prevented the collection of the 10-foot sample.

One soil sample was proposed to be collected at location HA11 at a depth of 15 feet bgs to assess the vertical distribution of lead where a previous detection of 140 mg/kg of lead (below the California-modified residential PRG) at 10 feet bgs has been reported. However, the original and alternate cores were close to the wall in a sloped area of the hallway and the direct push rig could not be set up safely on either core. Therefore, this sample could not be collected.

Soil samples were collected from four boreholes (HA13, HA18, HA19, and HA20) to assess the distribution of lead in the vicinity of HA11. At each location, the samples were collected at three depths: 5 feet bgs, 10 feet bgs, and 15 feet bgs using direct push equipment, and analyzed for lead. The exception was location HA13 where one sample was collected from a depth of 4 feet bgs (instead of 5 feet bgs, 10 feet bgs, and 15 feet bgs). Two attempts were made to collect the deeper soil samples at location HA13 and its adjacent borehole; however obstruction at 4 feet bgs at both boreholes prevented the collection of the 10-foot and 15-foot samples.

4. Investigation Results

This section presents analytical results and discusses the results of data evaluation and risk screening. The analytical results for the samples collected at PRL 297 along with the screening level of lead which is the California-modified residential PRG per the Work Plan are presented in Table 3. Appendix B presents the land surveying data.

4.1 Analytical Results and Quality Assurance

Results are flagged as estimated due to laboratory quality control results (matrix spike recoveries) exceeding planned limits. The exceedance was not substantial and the analytical batch was validated based on other quality control (laboratory control standards). The data is usable and no changes to the conclusions or recommendations are warranted.

4.2 Results Evaluation and Risk Screening

4.2.1 Results Evaluation

None of the additional soil samples collected in the vicinity of locations HA1 and HA11 contained lead concentrations exceeding the screening level i.e., California-modified residential PRG of 150 mg/kg. These results indicate that the lead concentration reported at locations HA1 (214 mg/kg) and HA11 (140 mg/kg) in 2005 are highly localized and are not indicative of a significant release.

Evidence to support this conclusion includes the absence of any other elevated metal concentrations at locations HA1 and HA11 during the previous sampling in 2005, which would likely be present if a release of contaminants due to processing activities had occurred. Further, samples collected at other process pits with similar activities at Building 297 during the 2005 sampling did not have elevated concentrations of lead or other metals either, as might be expected if a release due to processing operations had occurred. Therefore, it does not appear that the single detection of lead above the California-modified residential PRG at location HA1 during the 2005 investigation is indicative of wide-spread release.

4.2.2 Risk Screening

Risk screening was performed to evaluate risks associated with potential exposures to reported analytes in the soil at PRL 297. The methodology for risk screening is presented in Section 3.3 of the main text of the SI Report and results are presented in Table 4.

The forty one soil samples analyzed at PRL 297 (including the 2005 and 2008 investigations) have an average lead concentration of 15.3 mg/kg. The first step in risk screening of lead was to estimate a reasonable maximum exposure point concentration (EPC) for lead, which corresponds to the highest exposure that is reasonably expected to occur at the site. The value of reasonable maximum EPC was estimated for lead by calculating the 95 percent upper confidence limit (UCL) of the mean concentration, and comparing it with its maximum reported concentration; the lesser of the two values (95 percent UCL and maximum detected concentration) was then used as the reasonable maximum EPC for lead. The 95 percent UCL of the mean concentration of lead at PRL 297 was estimated using the ProUCL program that is based on the EPA (2002) guidance document. Lead concentrations do not follow lognormal distribution; therefore, the 99% Chebyshev UCL method described in the EPA guidance document was used for the 95-percent-UCL calculation. The 95 percent UCL of the mean concentration of lead using this method was estimated to be 76.3 mg/kg, which is less than the maximum reported concentration of 214 mg/kg. Therefore, the value of reasonable maximum EPC for lead was estimated to be 76.3 mg/kg, which is less than the California-modified residential soil PRG of 150 mg/kg.

The cumulative maximum carcinogenic risk (including results from the 2005 investigations) due to potential exposure to maximum reported concentrations of constituents analyzed at PRL 297 is $5x10^{-7}$, which is less than the EPA point of departure risk level of 10^{-6}.

The cumulative noncancer hazard associated (including results from the 2005 investigations) with potential exposure to maximum reported concentrations of metals is expressed as a hazard index (HI) of 0.06, which is less than the target HI of 1. A hazard quotient for lead could not be determined because the PRGs for lead were developed using the blood-lead levels and a reference dose is not available.

5. Conclusions and Recommendations

The primary objective of investigations conducted at PRL 297 was to assess whether a significant release of hazardous substances or pollutants into the environment has occurred. A review of available records, visual site inspections, and soil sampling were conducted for this assessment. One soil sample collected in 2005 contained lead concentration in excess of the California-modified residential PRG. Subsequent samples were collected in 2008 to characterize the distribution of lead. The reported concentrations of lead in all subsequent samples were less than the California-modified residential PRG, and are not indicative of a significant release. This conclusion is supported by the absence of other metals at elevated concentrations in the sample from locations HA1 and HA11 and the absence of elevated concentrations of all metal analytes at other sample locations at PRL 297 during the previous soil sampling conducted in 2005.

The estimated cancer risk at PRL 297 is less than the EPA point of departure value of 10^{-6} and the noncancer hazard at this PRL is less than the target HI of 1. Based on these observations and results, no further investigation is recommended for PRL 297.

6. References

Bechtel National, Inc. (BNI). 1996. *Final Technical Memorandum, Background and Reference Levels, Remedial Investigations, Marine Corps Air Station El Toro, California.* San Diego, CA: NAVFAC EFD SOUTHWEST.

———. 1997. *Draft Final Phase II Remedial Investigation Report, Operable Unit 2A – Site 24. Marine Corps Air Station El Toro, California.* March.

Department of the Navy (DON). 1944. Marine Corps Air Station, Air Base Group-2 El Toro, California, Assembly and Repair Shop, Building No. 3, Ground Floor Plan, Plumbing. Drawing No. 311,489.

———. 1944. Marine Corps Air Station, Air Base Group-2 El Toro, California, Assembly and Repair Shop, Building Nos. 2 & 3, Pit Details. Drawing. No. 311,481.

———. 1944. Marine Corps Air Station, Air Base Group-2 El Toro, California, Assembly and Repair Shop, Building No. 3, Pit Details. Drawing. No. 311482, 311484.

Earth Tech, Inc. (Earth Tech). 2002. *Draft Final Site Closure Report Vadose Zone Remediation IRP Site 24, Volatile Organic Compounds Source Area, Former MCAS-El Toro, California.* Honolulu, HI. June.

_____. 2005. *Summary Report for Group III Potential Release Locations, Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. October.

_____. 2008. *Final Site Inspection Work Plan, Potential Release Locations, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. May.

Eleventh Naval District. 1945. Marine Corps Air Station, Air Base Group-2 El Toro, California, Assembly and Repair Shop, Building No. 3, Plating & Anodizing Shop, Electrical. RW Drawing No. KV40/N5-34(75). August.

Environmental Protection Agency (EPA), United States. 2002. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites.* Office of Emergency and Remedial Response. OSWER 9285.6-10. Washington, D.C. December.

———. 2004a. *EPA Region 9 PRGs* [Preliminary Remediation Goals] *Tables.* San Francisco, CA. October.

———. 2004b. *SW-846 On-Line, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm. Office of Solid Waste.

———. 2006. *Guidance for the Data Quality Objectives Process. EPA QA/G-4.* EPA/240/B-06/001. Office of Environmental Information. August.

Jacobs Engineering Group (JEG). 1993. *Marine Corps Air Station El Toro, El Toro, California, Installation Restoration Program, Resource Conservation and Recovery Act (RCRA) Facility Assessment Report.* July.

Marine Corps Air Station. 1971. Modifications, Repairs and Equipment Installation in Buildings 295, 296, and 315; Building 297: First Floor South Area; New and Modified Floor Plan. NAVFAC Drawing No. 6004967. El Toro (Santa Ana), CA. May.

———. 1971. Modifications, Repairs and Equipment Installation in Buildings 295, 296, and 315; Building 297: First Floor, Center Area and Second Floor, South Area, Exist. and Demo. Floor Plans. NAVFAC Drawing No. 6004968. El Toro (Santa Ana), CA. May.

Naval Facilities Engineering Command Southwest (NAVFAC SW). 2003. *Final Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* San Diego, CA. September.

OHM Remediation (OHM). 1997. *Underground Storage Tank 297C and Oil-Water Separator 297B, Marine Corps Air Station, El Toro, California.* San Diego, CA. June.

Tables

Table 1: Locations of Concern – PRL 297

LOC Name	Description	Action	Status	Concurrence
OWS 297B	100-gallon OWS	Removed	NFA	OCHA, 11 July 1997
RFA 74	Aircraft wash area	Investigated, RCRA Facility Assessment	NFA	DTSC, 23 July 1996
RFA 78	Drum storage area	Investigated, Final RCRA Facility Assessment Report (JEG 1993). NFA status identified in Final RFA Report (JEG 1993) and regulatory concurrence obtained. To be evaluated with TAA 297 based on DTSC comments dated 11/5/2002.	FA	
RFA 79				
RFA 80				
RFA 81				
RFA 82				
TAA 297 (SWMU/AOC 73)	Less than 90 day TAA	Sampling results identified contaminants in soil up to 5 feet below ground surface (bgs); soil removal recommended. Site closure report submitted in March 2002. Site has been expanded based on DTSC comments dated 5 November 2002.	FA	
UST 297A	600-gallon diesel UST	Removed	NFA	OCHA, 9 December 1996
UST 297C	185-gallon waste oil UST	Removed	NFA	OCHA, 11 July 1997

Notes:
AOC = area of concern
bgs = below ground surface
DTSC = Department of Toxic Substances Control
FA = further action
JEG = Jacobs Engineering Group
LOC = location of concern
NFA = no further action
OCHA = Orange County Health Care Agency
OWS = Oil/water separator
PRL = potential release location
RCRA = Resource Conservation and Recovery Act
RFA = RCRA Facility Assessment
SWMU = Solid Waste Management Area
TAA = temporary accumulation area
UST = underground storage tank

Table 2: Soil Sampling and Analyses Summary – PRL 297

Sample Location	EPA ID	Sample Depth (feet bgs)	Actual Depth in the field if different than in the Final SI Work Plan (Earth Tech 2008) (feet bgs)	Sampling Technique	Analyte Group and Analytical Method[a]
					Lead 6010B
HA1	LW015	10		Direct Push	X
HA15	LW016	4		Direct Push	X
HA15	LW017	10		Direct Push	X
HA16	LW018	4		Direct Push	X
HA16	LW019	10		Direct Push	X
HA17*	LW020	4	3.5 - Refusal	Direct Push	X
HA17	LW021	10	Sample Not Collected	Direct Push	X
HA21*	LW022	4	3.5 -Refusal	Direct Push	X
HA21	LW023	10	Sample Not Collected	Direct Push	X
HA11*	LW024	15	Sample Not Collected	Direct Push	X
HA13*	LW025	5	4 - Refusal	Direct Push	X
HA13	LW026	10	Sample Not Collected	Direct Push	X
HA13	LW027	15	Sample Not Collected	Direct Push	X
HA18	LW028	5		Direct Push	X
HA18	LW029	10		Direct Push	X
HA18	LW030	15		Direct Push	X
HA19	LW031	5		Direct Push	X
HA19	LW032	10		Direct Push	X
HA19	LW033	15		Direct Push	X
HA20	LW034	5		Direct Push	X
HA20	LW035	10		Direct Push	X
HA20	LW036	15		Direct Push	X

Notes:
* Sample at location HA11 could not be collected as the original and alternate cores were close to the wall in a sloped area of the hallway and the direct push rig could not be set up safely on either core. Refusal occurred at locations HA17 and HA21 at 3.5 feet bgs and at location HA13 at 4 feet bgs and the deeper soil samples were not collected.
[a] Analysis was in general accordance with the listed methods provided in EPA Publication SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.

bgs below ground surface
EPA Environmental Protection Agency
ID identification
PRL potential release location
SI Site Inspection
X analysis was performed for the specified analyte

Table 3: Analytical Results Summary – PRL 297

Sample Location	EPA ID	Sample Depth (feet bgs)	Lead Concentration (mg/kg) (150 mg/kg)[a] (15.1 mg/kg)[b]
HA1	LW015	10	3.9 J
HA15	LW016	4	4.4 J
HA15	LW017	10	4.3 J
HA16	LW018	4	6.7 J
HA16	LW019	10	4.4 J
HA17	LW020	3.5	2.4 J
HA17	LW021	10	--
HA21	LW022	3.5	2.4 J
HA21	LW023	10	--
HA11	LW024	15	--
HA13	LW025	4	1.4 J
HA13	LW026	10	--
HA13	LW027	15	--
HA18	LW028	5	2.9
HA18	LW029	10	4.1 J
HA18	LW030	15	4.7 J
HA19	LW031	5	3.2 J
HA19	LW032	10	3.2 J
HA19	LW033	15	3.5 J
HA20	LW034	5	3
HA20	LW035	10	4.8
HA20	LW036	15	3.2

Notes:
[a] Screening Level as per the *Final SI Work Plan* (Earth Tech 2008), which is the California-modified residential PRG (EPA 2004a).
[b] MCAS El Toro Background value (BNI 1996).

--	Soil sample could not be collected
bgs	below ground surface
BNI	Bechtel National, Inc.
EPA	Environmental Protection Agency
ID	identification
J	indicates an estimated value
MCAS	Marine Corps Air Station
mg/kg	milligrams per kilogram
PRG	preliminary remediation goal
PRL	potential release location
SI	Site Inspection

Table 4: Risk Screening Results - PRL 297

Constituents	MCAS El Toro Background Concentrations (95th Quantile)[a]	Resonable Maximum EPC*	Carcinogenic PRG[b]	Noncarcinogenic PRG[b]	Risk Corresponding to Reasonable Maximum EPC			
					Carcinogenic		Noncarcinogenic	
					Excess Cancer Risk[c]	Percent Contribution to Cancer Risk[d]	HI[e]	Percent Contribution to Noncancer Hazard[d]
Metals (mg/kg)								
Cadmium	2.35	1.5	1.4E+03	3.7E+01	1.1E-09	0.2%	4.1E-02	63.2%
Chromium	26.9	106	2.1E+02	--	5.0E-07	99.8%	--	--
Copper	10.5	24.9	--	3.1E+03	--	--	8.0E-03	12.4%
Lead[f]	15.1	76.28	--	1.5E+02	--	--	--	--
Nickel	15.3	16	--	1.6E+03	--	--	1.0E-02	16.0%
Silver	0.539	0.43	--	3.9E+02	--	--	1.1E-03	1.7%
Zinc	77.9	101	--	2.3E+04	--	--	4.3E-03	6.7%
			Cumulative Maximum Risk		**5.0E-07**		**0.06**	

Notes:

*The maximum reported concentrations of analytes have been used as resonable maximum EPC, except for lead for which the 95% UCL concentration has been estimated using the ProUCL Version 4.

[a] Source: BNI 1996

[b] United States EPA Region 9 PRGs (2004a)

[c] Excess cancer risk = 1E-06 x (Maximum EPC/Carcinogenic PRG)

[d] With respect to cumulative excess cancer risk or hazard index

[e] HI = Maximum EPC / Noncarcinogenic PRG

[f] Analytical results for lead were compared to California-modified PRG (2004a) because it is significantly more protective than the corresponding EPA Region 9 PRG

An hazard quotient for lead could not be determined because the PRGs for lead were developed using the blood-lead levels and a reference dose is not available

-- = value does not exist

BNI = Bechtel National, Inc.

EPA = Environmental Protection Agency

EPC = exposure point concentration

HI = hazard index

MCAS = Marine Corps Air Station

mg/kg = milligrams per kilogram

PRG = preliminary remediation goal

PRL = potential release location

Figures

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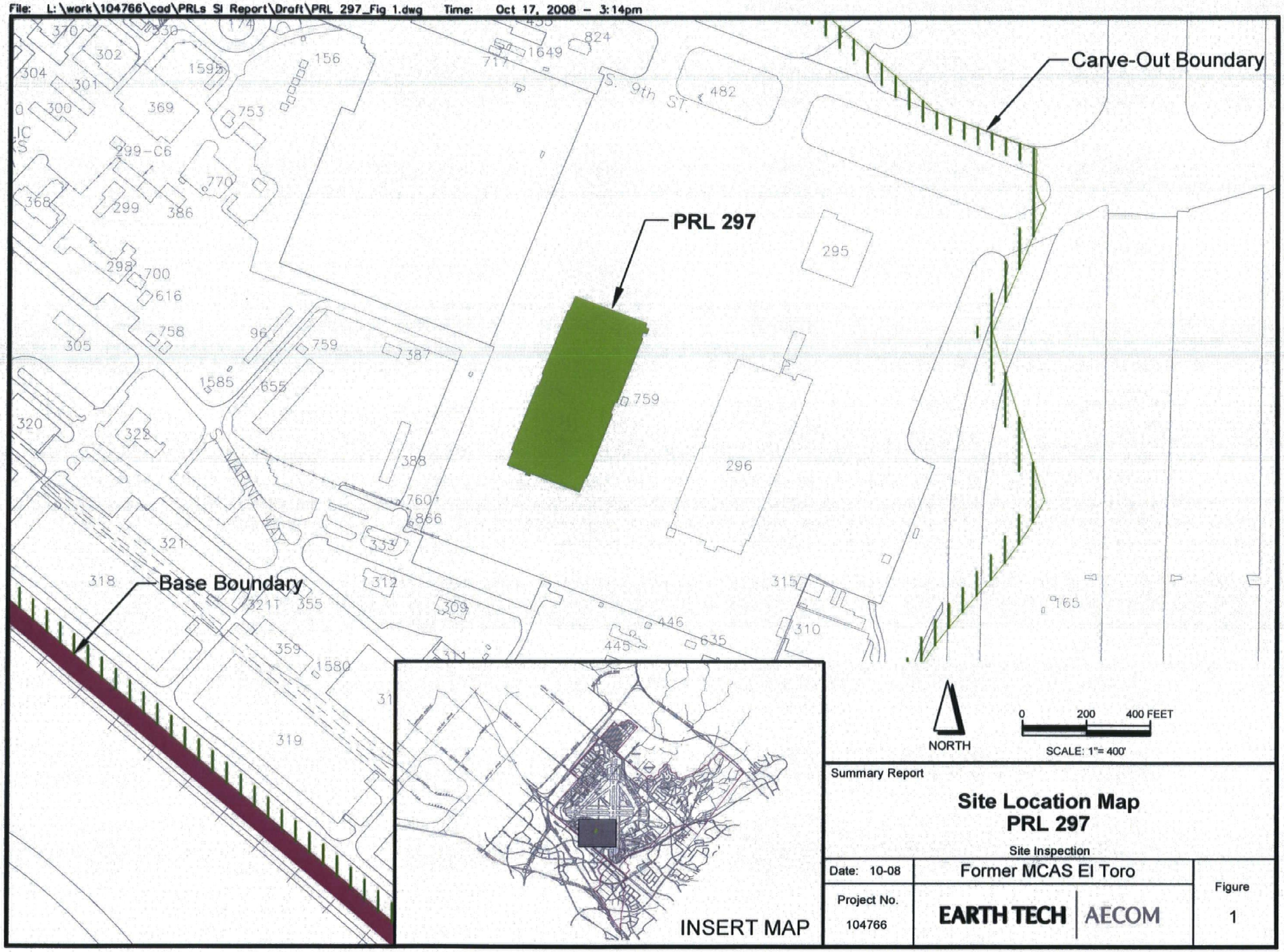

Summary Report

Site Location Map
PRL 297

Site Inspection

Date: 10-08	Former MCAS El Toro	Figure 1
Project No. 104766	EARTH TECH | AECOM	

Building 297 (Facing North)

Damaged Floor in South Elevator Room/Hazardous Material Storage Room Adjacent to Pit No. 9 (Facing North)

Interior of Building 297 (Facing South)

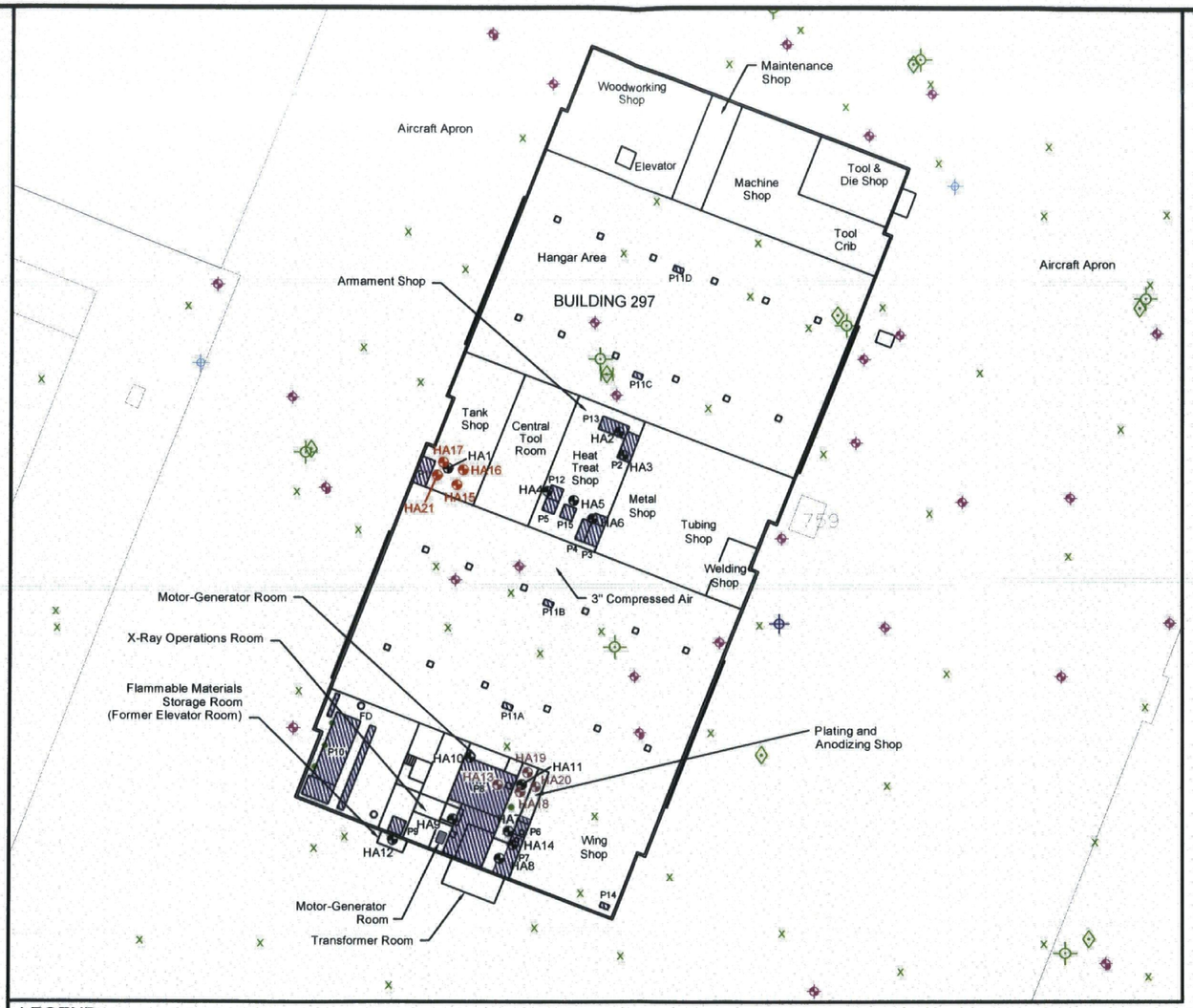

Table 1: List of Process Pits in Building 297

Pit Number	Dimensions (feet)[1]	Hangar Area	Comments
1	23 x 10 x 4.2	Tank Shop	Drains to sump
2	19 x 10 x 3.2	Armament Shop	Tanks: Hot Water Rinse, Lubrite Solution, Warm Water Rinse, Mild Alkaline Cleaner
3	16.4 x 9.6 x 4	Heat Treat Shop	Furnace
3 (Sump)	5 x 5 x 14	Heat Treat Shop	Furnace
4	15.2 x 6.8 x 6.4	Heat Treat Shop	Furnace
5	9 x 9 x 9.3	Heat Treat Shop	Oil Quench Tank
6	13 x 6 x 6	Plating and Anodizing Shop	Degreaser Tank
7	27.8 x 12.2 x 4	Plating and Anodizing Shop	Tanks: Alkali Strip, Rinse, Acid Dip
8	67 x 40 x varies in depth up to 4 feet	Plating and Anodizing Shop	Tanks: Electroclean Tanks (2) Cold Rinse Tanks (3) Reverse Chrome Tank Hard Chrome Plating Tank Alkaline Strip Tank Acid Dip Tanks (2) Hot Rinse Tanks (4) Chromic Dip Tank Zinc Plate Tank Cyanide Dip Tank Cadmium Plate Tank Zinc Strip Tank Cadmium Strip Tank Copper Plate Tank Cadmium Plating Barrel Anodizing Tank Nickel Plating Tank Cleaning Tank
9	9 x 7.5 x 6.5	Plating and Anodizing Shop	Adjacent to elevator
10A	48 x 16 x 3.8	Cleaning Shop	Stripping Tank
10B	18.5 x 15 x 6.7	Cleaning Shop	Stripping (Alkali)Tank
10 (Trench)	16 (Approximate) x 2	Cleaning Shop	Drains to Pit No. 10
11 (4)	4.7 x 6 x 5	Hangar	Compressed Air Distribution Pits (connected to storm drain)
12	7.2 x 7.2 x 2.1	Heat Treat Shop	Water Quench Tank
13	8 x 17 x 3.2	Armament Shop	Tanks: Degreaser
14	4.7 x 6 x 5	Wing Shop	Compressed Air Distribution Pit (connected to storm drain)
15	9 x 9 x 9.3	Heat Treat Shop	Water Quench Tank

Notes:
1. Dimensions reported as length (in reference to building's longitudinal axis) by width by depth (deepest point) in feet. Dimensions are inside dimensions and do not include 8 to 10-inch walls and bottom slabs.

LEGEND:

- Equipment Pad
- Former Process Pit or Trench
- Approximate 1993 Phase I RI Monitoring Well Location (Bechtel 1997) (Total Depth: 170 to 240 ft bgs; Groundwater Analytes: VOCs, SVOCs, TPH, Metals and General Chemistry; Soil Analytes: VOCs)
- Approximate 1993 RFA Soil Boring Location (Sample Depth: 5 to 25 ft bgs; Analytes: TPH and VOCs)
- Approximate Phase II RI Soil Boring Location; Completed as Soil Vapor Extraction Well (Bechtel, 1997) (Sample Depth: 85 to 129 ft bgs; Analytes: VOCs)
- Approximate Phase II RI Hand Auger Location (Bechtel 1997) (Sample Depth: 2.5 to 15 ft bgs; Analytes: VOCs)
- Approximate Phase I RI Soil Gas Location (Bechtel 1997) (Sample Depth: 30 ft bgs; Analytes: VOCs and TPH)
- Approximate Phase II RI CPT Adjacent to Soil Gas Sample Location, Symbol Implies Nearby 24SG1 Soil Gas Sample Location (Bechtel 1997) (Sample Depth: 30 ft bgs to Groundwater; Lithology Only)
- Approximate Phase II RI Soil Gas Sample Location Only (Bechtel 1997) (Sample Depth: 30 ft bgs to Groundwater; Analytes: VOCs and TPH)
- 1997 Confirmatory Sample Location (OHM 1997) (Sample Depth: 18.5 ft bgs; Analytes: TPH and VOCs)
- SVE Wells used in Remedial Action for Vadose Zone (Earth Tech) Closure Report (2002)
- HA1 — Soil Sample Location (Earth Tech 2005) (Sample Depth: 1 to 16 ft bgs; Analytes: Metals, pH, and Cyanide) In addidtion, Soil Sample was Collected at Location HA13 (Earth Tech 2005) (Sample Depth: 2 ft bgs; Analytes: Metals, pH, and Cyanide)
- HA15 — Soil Sample Location (Earth Tech 2008) (Sample Depth: 4 ft and 10 ft bgs; Analytes: Lead). In addidtion, Soil Sample was Collected at 10 ft bgs at Location HA1 and Analyzed for Lead. Refusal Occured at Locations HA17 and HA21 at 3.5 ft bgs and the Deeper Soil Samples were not Collected.
- HA18 — Soil Sample Location (Earth Tech 20080 (Sample Depth: 5 ft, 10ft, and 15 ft bgs; Analytes: Lead). Soil Sample at Location HA11 at 15 ft bgs Could not be Collected. Refusal Occured at Location HA13 at 4 ft bgs and the Deeper Soil Samples were not Collected.

NORTH

0 50' 100 FEET

SCALE: 1"= 100'

Features and interior layout are approximate and may not be to scale

Summary Report

Site Plan
PRL 297

Site Inspection

Date: 10-08	Former MCAS El Toro	Figure
Project No. 104766	EARTH TECH | AECOM	2

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Appendix A
Previous Soil Sampling Results

Table A-1: Analytical Results Summary - PRL 297

Analyte	MCAS El Toro Background Concentrations (95th Quantile)[a]	Residential Soil PRG[b]	Sample Location	PRL 297-HA1	PRL 297-HA2	PRL 297-HA2	PRL 297-HA3	PRL 297-HA3	PRL 297-HA4	PRL 297-HA4	PRL 297-HA5	PRL 297-HA5	PRL 297-HA6	PRL 297-HA6
			Sample Depth	4 ft bgs	5 ft bgs	10 ft bgs	5 ft bgs	10 ft bgs	5 ft bgs	10 ft bgs	5 ft bgs	10 ft bgs	8 ft bgs	16 ft bgs
			EPA ID	LJ491	LJ435	LJ436	LJ437	LJ438	LJ439	LJ440	LJ441	LJ442	LJ391	LJ392
Metals (mg/kg)														
Cadmium	2.35	3.7E+01		0.9	1.2 J	0.68 J	1 J	0.62 J	0.98 J	0.28 J	1.3 J	0.93 J	0.3	1.5
Chromium	26.9	2.1E+02		15	19.1	16.1	15.9	17.3	15.9	9.3	15.4	14	5.9	22.7
Copper	10.5	3.1E+03		*11.7*	*12.2*	9.8	*10.6*	9.6	10.2	6.1	*11.2*	9.7	5.9	*15.5*
Lead[c]	15.1	1.5E+02		**214**	5.2	4.2	4.8	4.5	4.4	2.3	*54.7*	*34.4*	*19*	6.5
Nickel	15.3	1.6E+03		12.5	*16 J*	9.4 J	12.9 J	10.7 J	12.3 J	5.9 J	13.5 J	11.5 J	5.9	*15.4*
Silver	0.539	3.9E+02		0.61 U	0.58 U	0.59 U	0.59 U	0.59 U	0.57 U	0.54 U	0.59 U	0.43	0.55 U	0.65 U
Zinc	77.9	2.3E+04		65.5	67	62.8	60.2	68.7	58.8	35.6	60.2	53.5	25.9	*101*
General Chemistry														
pH	--	--		8.04	8.1	9.19	8.21	8.95	8.81	9.03	8.5	8.62	8.56	8.36

Notes

Concentrations in **bold** indicate values greater than the residential soil PRGs and the former MCAS El Toro background values

Concentrations with *italic underline* indicate values greater than the former MCAS El Toro background, but less than the residential soil PRGs

[a] Source: BNI 1996a

[b] Analytical results were compared to EPA Region 9 PRGs (EPA 2004)

[c] Analytical results for lead were compared to California-modified PRGs (EPA 2004) because they are significantly more protective than the corresponding EPA Region 9 PRGs

-- = value does not exist

bgs = below ground surface

BNI = Bechtel National, Inc.

EPA = Environmental Protection Agency

ID = identification

J = indicates an estimated value

MCAS = Marine Corps Air Station

mg/kg = milligrams per kilogram

NA = not analyzed

pH = negative logarithm of hydrogen ion concentration

PRG = preliminary remediation goal

PRL = potential release location

U= indicates the compound or analyte was analyzed for but was not detected at or above the stated limit

Table A-1: Analytical Results Summary - PRL 297

Analyte	MCAS El Toro Background Concentrations (95th Quantile)[a]	Residential Soil PRG[b]	Sample Location	PRL 297-HA7	PRL 297-HA7	PRL 297-HA8	PRL 297-HA8	PRL 297-HA9	PRL 297-HA9	PRL 297-HA10	PRL 297-HA10	PRL 297-HA11	PRL 297-HA11	PRL 297-HA12	PRL 297-HA13	PRL 297-HA14
			Sample Depth	5 ft bgs	10 ft bgs	5 ft bgs	10 ft bgs	5 ft bgs	10 ft bgs	5 ft bgs	10 ft bgs	5 ft bgs	10 ft bgs	1 ft bgs	2 ft bgs	2 ft bgs
			EPA ID	LJ387	LJ388	LJ389	LJ390	LJ393	LJ394	LJ396	LJ397	LJ443	LJ444	LJ386	LJ398	LJ399
Metals (mg/kg)																
Cadmium	2.35	3.7E+01		0.63	0.9	0.37	1.1	0.73	0.47	0.74	1	0.58 J	0.7 J	0.87	0.29	0.27
Chromium	26.9	2.1E+02		9.1	15.5	6.7	18.7	9.2	8.2	7.6	17	10.5	11.1	*106*	4.1	3.6
Copper	10.5	3.1E+03		7.1	*10.8*	4	*12.1*	5.8	4.7	4.8	*10.9*	5.7	6.4	*24.9*	2.7	3.3
Lead[c]	15.1	1.5E+02		6.1	*19.1*	1.8	6	*18*	2.3	3.2	4.4	2.7	*140*	4.7	1.8	1.6
Nickel	15.3	1.6E+03		7.5	11.7	4.9	14	8.2	6.7	6.5	12.8	7.5 J	8 J	7.3	3.3	3.4
Silver	0.539	3.9E+02		0.063	0.26	0.53 U	0.15	0.56 U	0.54 U	0.55 U	0.64 U	0.53 U	0.54 U	0.57 U	0.54 U	0.54 U
Zinc	77.9	2.3E+04		37.8	62.5	27.2	77.1	33.8	32.1	31.1	65.6	36.7	40.7	55.5	16.7	16.3
General Chemistry																
pH	--	--		8.66	8.64	8.53	8.83	8.83	9.25	8.67	8.53	7.37	8.5	4.99	9.09	10.3

Notes

Concentrations in **bold** indicate values greater than the residential soil PRGs and the former MCAS El Toro background values

Concentrations with *italic underline* indicate values greater than the former MCAS El Toro background, but less than the residential soil PRGs

[a] Source: BNI 1996a

[b] Analytical results were compared to EPA Region 9 PRGs (EPA 2004)

[c] Analytical results for lead were compared to California-modified PRGs (EPA 2004) because they are significantly more protective than the corresponding EPA Region 9 PRGs

-- = value does not exist

bgs = below ground surface

BNI = Bechtel National, Inc.

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ID = identification

J = indicates an estimated value

MCAS = Marine Corps Air Station

mg/kg = milligrams per kilogram

NA = not analyzed

pH = negative logarithm of hydrogen ion concentration

PRG = preliminary remediation goal

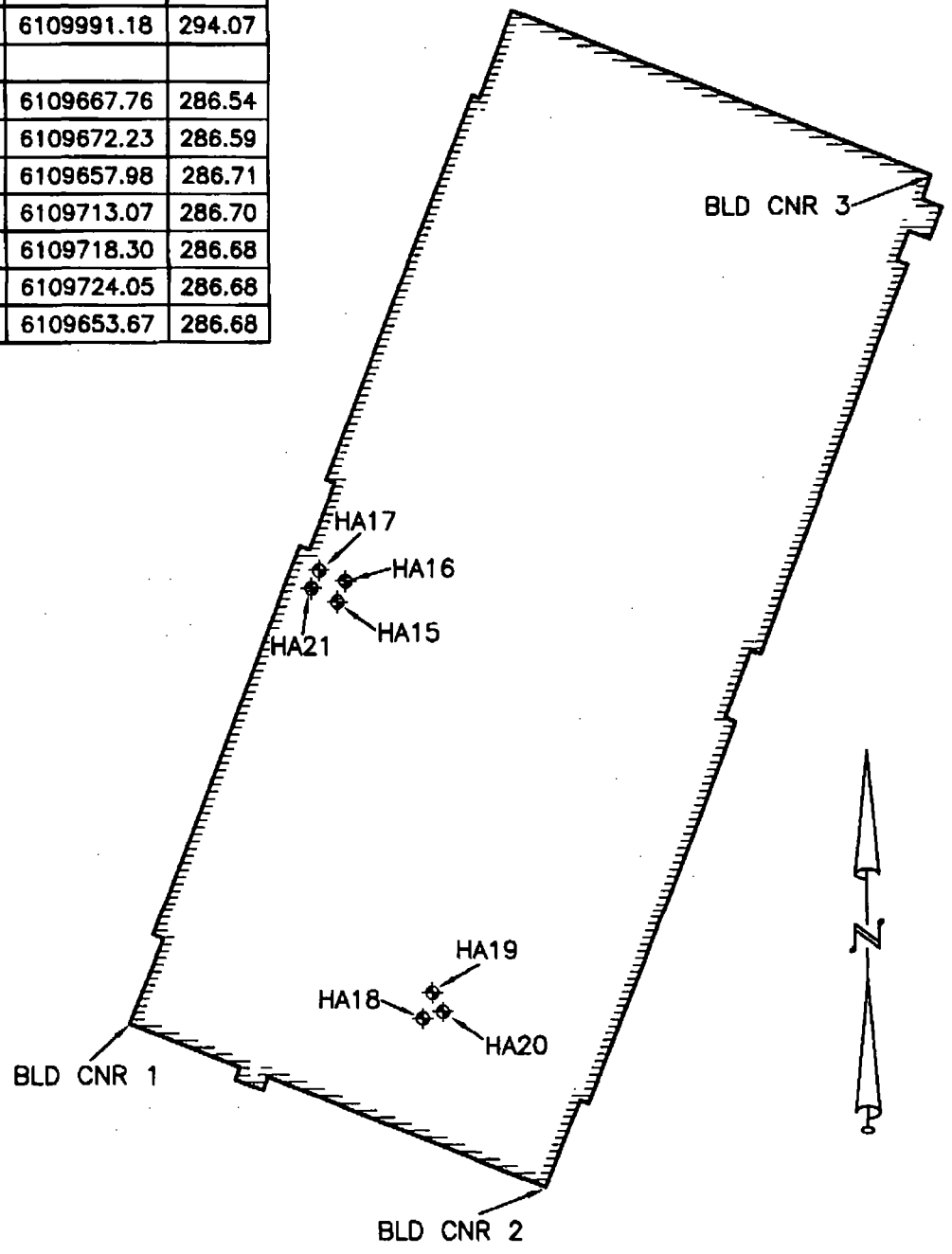
PRL = potential release location

U= indicates the compound or analyte was analyzed for but was not detected at or above the stated limit

Appendix B
Land Surveying Data

PRL297-BLD297

PRL AND NOTABLE FEATURES LOCATIONS			
STATION	**NORTHINGS**	**EASTINGS**	**ELEV.**
BLD CNR 1	2188552.98	6109553.69	286.45
BLD CNR 2	2188464.65	6109779.55	286.51
BLD CNR 3	2189007.60	6109991.18	294.07
HA15	2188778.34	6109667.76	286.54
HA16	2188789.20	6109672.23	286.59
HA17	2188794.68	6109657.98	286.71
HA18	2188555.52	6109713.07	286.70
HA19	2188569.66	6109718.30	286.68
HA20	2188559.21	6109724.05	286.68
HA21	2188785.32	6109653.67	286.68



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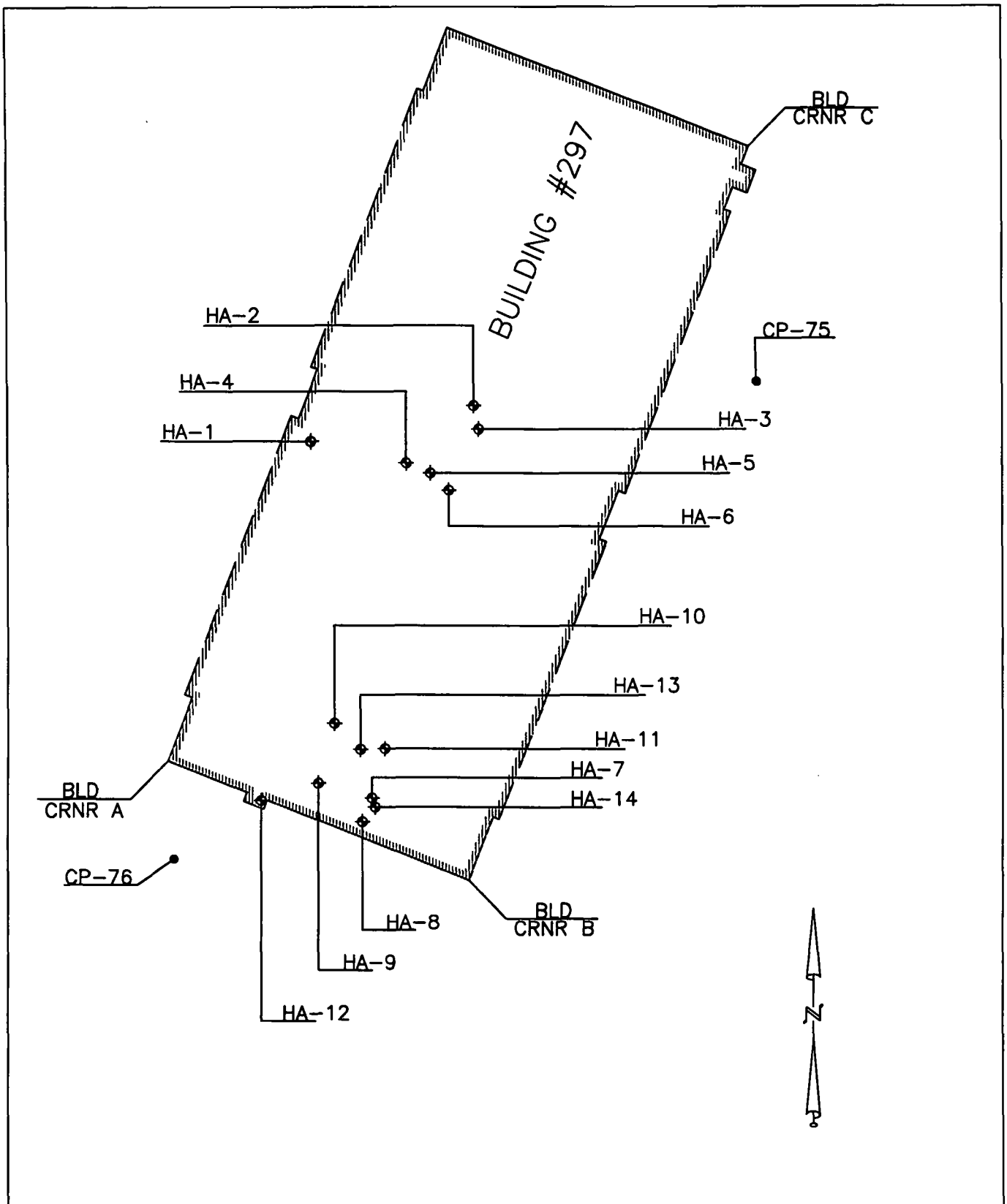
POTENTIAL RELEASE LOCATION SKETCH

SCALE:	1"= 90'	DATE:	05/30/2008
BY:	ANK	JOB NO.:	04-1058-2227.000-1019



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POTENTIAL RELEASE LOCATION SKETCH BUILDING #297			
SCALE:	1"=100'	DATE:	06-06-05
BY:	JCL	JOB NO.:	04-1058-2227.000-535

BUILDING #297 PRL AND NOTABLE FEATURES LOCATIONS			
STATION	NORTHING	EASTING	ELEVATION
BLD CRNR A	2188552.98	6109553.69	
BLD CRNR B	2188464.65	6109779.55	
BLD CRNR C	2189007.60	6109991.18	
CP 75	2188833.63	6109996.93	286.53
CP 76	2188479.95	6109558.47	285.51
BLD 297-HA 1	2188789.50	6109661.33	286.74
BLD 297-HA 2	2188815.89	6109783.71	286.79
BLD 297-HA 3	2188798.64	6109787.53	286.80
BLD 297-HA 4	2188773.36	6109732.58	286.77
BLD 297-HA 5	2188766.11	6109750.76	286.67
BLD 297-HA 6	2188753.32	6109764.70	286.63
BLD 297-HA 7	2188525.61	6109706.29	286.79
BLD 297-HA 8	2188507.96	6109699.07	286.79
BLD 297-HA 9	2188536.47	6109666.13	286.73
BLD 297-HA 10	2188580.94	6109677.97	286.75
BLD 297-HA 11	2188562.37	6109715.94	286.61
BLD 297-HA 12	2188523.50	6109623.87	286.36
BLD 297-HA 13	2188561.86	6109697.55	286.76
BLD 297-HA 14	2188518.80	6109708.66	286.78

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POTENTIAL RELEASE LOCATION SKETCH
BUILDING #297

SCALE: NONE	DATE: 06-06-05
BY: JCL	JOB NO.: 04-1058-2227.000-535

Atttachment 3: Summary Report - PRL 354

Summary Report for PRL 354, Site Inspection

FORMER MARINE CORPS AIR STATION EL TORO, CALIFORNIA

October 2008

Prepared for:
Base Realignment and Closure
Program Management Office West
San Diego, California

Prepared by:
Earth Tech, Inc.
841 Bishop Street, Suite 500
Honolulu, HI 96813-3920

Prepared under:
Naval Facilities Engineering Command
Contract Number N62742-03-D-1837
Contract Task Order 0032
DCN: ET-1837-0032-0001

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ACRONYMS AND ABBREVIATIONS

µg/dL	micrograms per deciliter
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
B(a)P	benzo(a)pyrene
bgs	below ground surface
BNI	Bechtel National, Inc.
DRMO	Defense Reutilization and Marketing Office
DTSC	Department of Toxic Substances Control
EBS	Environmental Baseline Survey
EPA	Environmental Protection Agency
EPC	exposure point concentration
HA	hand auger
HERD	Human and Ecological Risk Division
HI	hazard index
ID	identification
IRWD	Irvine Ranch Water District
ITRC	Interstate Technology and Regulatory Council
J	indicates an estimated value
LOC	location of concern
MCAS	Marine Corps Air Station
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
NAVFAC SW	Naval Facilities Engineering Command Southwest
NFA	no further action
OEHHA	Office of Environmental Health Hazard Assessment
PAH	polynuclear aromatic hydrocarbon
PEF	potency equivalency factor
PRG	preliminary remediation goal
PRL	potential release location
RCRA	Resource Conservation and Recovery Act
SI	Site Inspection
SWMU	Solid Waste Management Unit
U	indicates the compound or analyte was analyzed for but was not detected at or above the stated limit
UJ	indicates the compound or analyte was analyzed for but was not detected; and the sample detection limit is an estimated value
UCL	upper confidence limit
USACE	United States Army Corp of Engineers
USMCAS PWD	United States Marine Corps Air Station, Public Works Department
X	analysis was performed for the specified analyte

1. Background

Potential Release Location (PRL) 354 refers to two separate Skeet Ranges near the eastern boundary of the station and northeast of the former golf course (Figure 1).

The original Skeet Range, Facility 236, was included in the June 1943 site plan (United States Army Corp of Engineers [USACE] 2001) and the 1947 Station list (United States Marine Corps Air Station, Public Works Department [USMCAS PWD] 1947). Based on the records obtained (USACE 2001), the original Skeet Range was likely in operation from 1943 to 1948, until it was razed for the golf course construction.

The relocated Skeet Range was constructed as Facility 354, northeast of the existing golf course near hole number 5 (USMCAS PWD 1952), as shown on Figure 2. This drawing also shows the relocated Skeet Range pivoted to the south but still overlapping the original Skeet Range. A portion of the relocated skeet range was razed in 1961, coinciding with the completion of two more golf holes by 1962 (USACE 2001).

Aerial photo analysis indicates the area occupied by the former Skeet Ranges has undergone considerable change. Land that was part of the southern portions of the ranges is now part of the golf course and the land that was part of the north and eastern portions of the ranges has been developed into roads, buildings, a Defense Reutilization and Marketing Office (DRMO) storage yard, and to accommodate expansion of the runway.

Two locations of concern (LOCs), previously associated with this site, have already been closed, and are presented in Table 1.

During the records review, previous investigations, and visual site inspections conducted in 2002 in support of the 2003 Environmental Baseline Survey (EBS) (Naval Facilities Engineering Command Southwest [NAVFAC SW] 2003) and in 2004 as part of the supplemental site reconnaissance, the Navy identified that former use of the site as a skeet range could have resulted in releases of hazardous substances. Hazardous constituents in target shots include lead, antimony and arsenic; and clay pigeons are known to contain polynuclear aromatic hydrocarbons (PAHs) (Interstate Technology and Regulatory Council [ITRC] 2003). No evidence of skeet range-related debris was identified during the 2002 visual site inspection conducted in support of the 2003 EBS (NAVFAC 2003). However, in a subsequent site reconnaissance conducted in May 2005, skeet fragments were found at PRL 354 (see Figure 2). Therefore, further investigation was recommended to characterize the area.

Soil Sampling 2005. Sampling conducted in June 2005 used a composite sample approach that took into consideration the heterogeneous nature of matrix materials and contaminants at firing ranges. Approximate boundaries of the shot fall areas for the two skeet range orientations and estimated areas of maximum shot fall were superimposed on the site plan, based on information from ITRC guidance (ITRC 2003). This information was used to bias sample locations to potentially affected areas.

Eight sample locations (HA1 through HA8) were selected to cover the different shot-fall areas and to target locations where clay pigeon fragments were found. At each location, three subsamples were collected at the surface, spaced in a triangular pattern at approximately 10 feet from the center point. The subsamples from each location were composited and analyzed for antimony, arsenic, lead, and PAHs. Following initial analysis, discrete samples for HA4, HA5, HA7, and HA8 were analyzed for arsenic and the discrete samples for HA7 were analyzed for lead.

Antimony was not detected above the Environmental Protection Agency (EPA) Region 9 residential preliminary remediation goal (PRG) (EPA 2004a) in any of the composite soil samples. Arsenic was reported at concentrations less than former Marine Corps Air Station (MCAS) El Toro background value (Bechtel National, Inc. [BNI] 1996) of 6.86 milligrams per kilogram (mg/kg) in all the composite and discrete samples analyzed. Lead was reported at concentrations exceeding the California-modified residential PRG (EPA 2004a) or former MCAS El Toro background value in the composite soil samples collected at locations HA1 through HA3, and HA6 through HA8; and in the discrete soil samples collected at locations HA7A, HA7B, and HA7C. Lead was reported at a maximum concentration of 198 mg/kg in the composite surface soil sample collected at location HA2, which is greater than the California-modified PRG value of 150 mg/kg. Lead was reported at a concentration of 15.8 mg/kg in the composite soil sample collected at location HA8, which is greater than the MCAS El Toro background value of 15.1 mg/kg, but less than the California-modified PRG value of 150 mg/kg. This lead concentration was less than the maximum concentration of 22.4 mg/kg in the background data set and is within the background range. PAHs were reported at concentrations exceeding their residential PRGs in the composite soil samples collected at locations HA1, HA2, HA3, and HA6.

The analytical results for these soil samples are presented in Appendix A. The sample locations are shown on Figure 2.

2. Site Inspection Objectives

The 2005 soil sampling results discussed above indicated that composite soil samples at locations HA1 through HA3 and HA6 through HA7 (0 feet to 0.2 feet below ground surface [bgs]) exceeded the EPA Region 9/California-modified residential soil PRGs for lead and PAHs. Therefore, discrete samples at the previous sampling locations as well as step out samples were collected to characterize the lateral and vertical distribution of lead and PAHs in this area. A summary of Site Inspection (SI) soil sampling activities is presented in Section 3, and the results are presented in Section 4.

3. Sampling and Analysis Summary

Sampling was conducted for PRL 354 in May 2008 in accordance with the *Final Site Inspection Work Plan, Potential Release Locations* (Work Plan) (Earth Tech 2008). The sample locations are shown on Figure 2 and a summary of sampling and analyses performed is provided in Table 2.

Thirteen additional soil samples were collected at PRL 354 (on the basis of exceedances observed during the 2005 soil sampling) at the surface (0 to 0.2 feet bgs) to characterize the distribution of PAHs/and or lead in soil exceeding the EPA Region 9 residential PRG/California-modified PRG concentration. The samples were collected using disposable trowels. A total of seven deeper vertical soil samples (0.5-foot to 1 feet bgs) were analyzed at locations where concentrations of lead and PAHs were reported above residential PRG values in the surface samples.

4. Investigation Results

This section presents analytical results and discusses the results of data evaluation and risk screening. The analytical results for the samples collected at PRL 354 along with the United States EPA Region 9 or California-modified residential PRGs (EPA 2004a) are presented in Table 3. Appendix B presents the land surveying data.

4.1 ANALYTICAL RESULTS AND QUALITY ASSURANCE

Some results (deeper soil samples collected at locations HA1, HA2, HA3, HA9, HA15, and HA16 for PAHs) were flagged as estimated as a result of a communication error that resulted in extraction past the method holding time. Samples were submitted and placed on hold. The laboratory did not act on the direction by the project team to perform the analysis. Once the lapse was identified, the Project Chemist and Quality Assurance Manager determined that the results would still be usable and that the analysis should proceed and be reported, although qualified. The samples had been stored at 4 degrees centigrade and the target analytes are not readily degraded. Independent, third-party validation determined the data are usable and no changes to conclusions or recommendations are warranted.

4.2 RESULTS EVALUATION AND RISK SCREENING

4.2.1 Results Evaluation

The following PAHs: (benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3,-cd]pyrene) were reported at concentrations exceeding their respective residential PRGs in the surface and deeper soil samples collected at locations HA1, HA2, HA3, HA9, HA15, and HA16. This is consistent with the 2005 soil sampling results where PAHs concentrations exceeding the residential soil PRGs were observed in the composite surface soil samples at locations HA1, HA2, and HA3 (except there is no PAH exceedance at location HA6 during this sampling round).

- Benz(a)anthracene was reported at concentrations ranging from 6.6 to 1,800 micrograms per kilogram [µg/kg];
- Benzo(a)pyrene was reported at concentrations ranging from 6 to 1,100 µg/kg;
- Benzo(b)floranthene was reported at concentrations ranging from ranging from 16 to 5,300 µg/kg;
- Benzo(k)fluoranthene was reported at concentrations ranging from 4.1 to 5,500 µg/kg;
- Dibenz(a,h)anthracene was reported at concentrations ranging from 5.2 to 690 µg/kg;
- Indeno(1,2,3,-cd)pyrene was reported at concentrations ranging from 10 to 1,800 µg/kg;

The maximum reported PAH concentrations were associated with the surface sample collected at location HA2. The PAHs concentrations in the deeper soil samples were less than the surface soil samples at all locations except at location HA1.

Lead was reported at concentrations exceeding its California-modified residential PRG in the surface soil samples collected at locations HA2, HA3, HA6, and HA16; and in the deeper soil samples collected at locations HA2, HA6, and HA16. Lead was reported at concentrations ranging from 8.9 to 332 mg/kg. This is consistent with the 2005 soil sampling results where lead concentrations exceeding the California-modified residential soil PRGs were observed in the composite surface soil samples at locations HA2, HA3, and HA6.

4.2.2 Risk Screening

Risk screening was performed to evaluate risks associated with potential exposure to reported analytes in the soil at PRL 354. The risk screening methodology is presented in Section 3.3 of the main text of the Summary Report, and results are presented in Table 4. As part of the risk estimation, the benzo(a)pyrene equivalent concentrations were calculated for the samples collected at PRL 354, using the potency equivalency factors provided in the updated Technical Support Document dated

May 2005 (Office of Environmental Health Hazard Assessment [OEHHA] 2005). This benzo(a)pyrene equivalent concentration was then used to estimate the carcinogenic risk at each of these locations due to PAHs. These calculations are presented in Table 5.

The first step in risk screening of constituents analyzed was to estimate a reasonable maximum exposure point concentration (EPC) for the reported constituents, which corresponds to the highest exposure that is reasonably expected to occur at the site. The value of reasonable maximum EPC was estimated by calculating the 95 percent upper confidence limit (UCL) of the mean concentration, and comparing it with its maximum reported concentration; the lesser of the two values (95 percent UCL and maximum reported concentration) was then used as the reasonable maximum EPC. The 95 percent UCL of the mean concentration of constituents at PRL 354 was estimated using the ProUCL program that is based on the EPA (2002) guidance document.

The twenty lead soil samples analyzed at PRL 354 (including three discrete soil samples from the 2005 investigation) have an average lead concentration of 106.8 mg/kg. Lead concentrations followed a lognormal distribution; therefore, the 95 percent Approximate Gamma UCL method described in the EPA guidance document was used for the 95-percent-UCL calculation. The 95 percent UCL of the mean concentration of lead using this method was estimated to be 157.1 mg/kg, which is comparable with California-modified residential PRG of 150 mg/kg and is less than the EPA Region 9 residential soil PRG of 400 mg/kg.

The cumulative carcinogenic risk due to potential exposure to reasonable maximum EPC of constituents analyzed at PRL 354 is $2x10^{-5}$. The cumulative carcinogenic risk corresponding to a benzo(a)pyrene equivalent EPC value of 1,068 µg/kg is $2x10^{-5}$. The computed carcinogenic risk for both scenarios is within the EPA-established risk management range of 10^{-6} to 10^{-4}.

The cumulative noncancer hazard associated with potential exposure to reasonable maximum EPCs of constituents analyzed is expressed as a hazard index (HI) of 0.0006, which is less than the target HI of 1. An hazard quotient for lead could not be determined because the PRGs for lead were developed using the blood-lead levels and a reference dose is not available.

The risks associated with exposure to lead at PRL 354 via dietary intake, drinking water, soil and dust ingestion, inhalation, and dermal contact were further evaluated using the DTSC's Lead Risk Assessment Spreadsheet, Version 7 (see Appendix C). The spreadsheet was used to calculate the blood lead level of concern for children, and compared with the target blood lead level of 10 micrograms per deciliter (µg/dL). The following input parameters were used in calculating a lead soil concentration that is protective of a residential-child-exposure scenario:

- *Lead in Air:* A default value of 0.028 microgram per cubic meter (µg/m^3) recommended by the DTSC Human and Ecological Risk Division (HERD) was used for the lead in air, which is the highest monthly average for any California monitoring site, based on the 1997 California Air Resources Board monitoring data.

- *Lead in Soil:* The 95 percent UCL of the mean concentration of lead estimated to be 157.1 mg/kg was used.

- *Lead in Water:* DTSC's HERD uses a default value of 15 micrograms per liter (µg/L) to estimate exposure to lead through drinking water based on the California Maximum Contaminant Level (MCL) for lead. HERD stated that this value may be replaced with valid monitoring data from the utility supplying water to the site. Irvine Ranch Water District (IRWD) 2004 Water Quality Report (IRWD 2004), indicates that of the 74 distribution-system lead samples collected by the IRWD, one sample had a lead concentration (18 ug/L)

that was greater than the MCL (15 ug/L). The analytical results ranged from not detected to 18 ug/L, with a 90th percentile value of less than 5.0 ug/L, or non-detect at the reporting limit of 5.0 ug/L. Based on this, a lead in water value of 2.5 µg/L was used (one half of the reporting limit of 5.0 µg/L).

- *% Home-grown Produce:* The default value of 7 percent suggested by DTSC's HERD was used.

- *Respirable Dust:* The default value of 1.5 $\mu g/m^3$ suggested by DTSC's HERD was used, which is based on the EPA's 1996 soil screening guidance.

These values result in a soil lead concentration that is protective of a residential child exposure scenario of 311 mg/kg. Since the 95 percent UCL of the mean concentration of lead does not result in an exceedance of the blood lead level of 10 µg/dL, lead does not pose any adverse health risk and does not warrant further investigation.

4.2.3 Risk Uncertainties

It should be noted that this value of the cumulative carcinogenic risk ($2x10^{-5}$) corresponding to the 95 percent UCL of the benzo(a)pyrene equivalents is likely an overestimation of cancer risk across the whole site and is not representative of actual site risk. This is because the maximum reported benzo(a)pyrene equivalent concentration associated with the surface sample collected at location HA2 was found to be a statistical outlier. The cumulative carcinogenic risk reduces further to $9x10^{-6}$ if the statistical outlier is not included in the risk assessment. The statistical outlier test was conducted using the ProUCL Version 4 program and the results are presented in Appendix D.

5. Conclusions and Recommendations

The primary objective of investigations conducted at PRL 354 was to characterize the distribution of lead and PAHs in soil. A review of available records, visual site inspections, and sampling activities were conducted for this assessment. The reasonable maximum EPC of lead was estimated to be 157.1 mg/kg, which is comparable with California-modified residential PRG of 150 mg/kg and is less than the EPA Region 9 residential soil PRG of 400 mg/kg. The DTSC's Lead Risk Assessment Spreadsheet, Version 7 indicated that this soil lead concentration is protective of a child receptor for residential exposure scenario at the site. The cumulative cancer risk for PRL 354 is within the EPA established risk management decision range of 10^{-6} to 10^{-4}. The cumulative cancer risk reduces further to $9x10^{-6}$ if the statistical outlier is not included in the risk assessment. Additionally, the noncancer hazard at this PRL is less than the target HI of 1. Based on these findings, the impacted soil is assessed not to pose a risk to human health or groundwater, and the ecological risk is not an issue due to the fact that these areas were historically industrial in nature and did not support viable habitat. Based on these observations and results, no further investigation is recommended for PRL 354.

6. References

Bechtel National, Inc. (BNI). 1996. *Final Technical Memorandum, Background and Reference Levels, Remedial Investigations, Marine Corps Air Station El Toro, California.* San Diego, CA: NAVFAC EFD SOUTHWEST.

Earth Tech, Inc. (Earth Tech). 2008. *Final Site Inspection Work Plan, Potential Release Locations, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. May.

Environmental Protection Agency (EPA), United States. 2002. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites*. Office of Emergency and Remedial Response. OSWER 9285.6-10. Washington, D.C. December.

———. 2004a. *EPA Region 9 PRGs* [Preliminary Remediation Goals] *Tables.* San Francisco, CA. October.

———. 2004b.*SW-846 On-Line, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm. Office of Solid Waste.

———. 2006. *Guidance for the Data Quality Objectives Process. EPA QA/G-4.* EPA/240/B-06/001. Office of Environmental Information. August.

Interstate Technology and Regulatory Council (ITRC). 2003. *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges.* January.

IRWD. 2004. *Annual Water Quality Report.*

Naval Facilities Engineering Command Southwest (NAVFAC SW). 1993. *Marine Corps Air Station El Toro, California, Installation Restoration Program Final RCRA Facility Assessment Report. Volume I.* July.

———. 2003. *Final Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* San Diego, CA. September.

———. 2004. Email communication. *El Toro FOST and FOSL Table/Attachment Edits.* April.

Office of Environmental Health Hazard Assessment. 2005. *Technical Support Document for Describing Available Cancer Potency Factors.*
http://www.oehha.org/air/hot_spots/pdf/May2005Hotspots.pdf. May.

US Army Corp of Engineers. 2001. Range Identification and Preliminary Range Assessment, Final, Marine Corps Air Station El Toro. Santa Ana, CA. September.

U.S. Marine Corps Air Station, Public Works Department (USMCAS PWD). 1947. Water Supply for Proposed Golf Course. May

———. 1952. Proposed Relocation of Existing Skeet Range, Plot and Drainage Plan. P.W. Drawing No. WO-16303. February.

———. Modifications to Golf Course. P.W. Drawing No. S-1978.

———. 1959. Golf Course Proposed Revisions to Sprinkler System. P.W. Drawing No. PU-1530.

Tables

Table 1: Former Locations of Concern – PRL 354

LOC Name	Description	Action	Status	Concurrence
SWMU 181	Land farming area	Investigated, RCRA Facility Assessment (NAVAFC SW 1993)	NFA	DTSC, 23 July 1996
SWMU 264	DRMO storage yard number 3	Investigated, RCRA Facility Assessment (NAVAFC SW 1993)	NFA	DTSC, 23 July 1996

Notes:
DRMO = Defense Reutilization and Marketing Office
DTSC = Department of Toxic Substances Control
LOC = location of concern
NAVFAC SW = Naval Facilities Engineering Command Southwest
NFA = no further action
PRL = potential release location
RCRA = Resource Conservation and Recovery Act
SWMU = Solid Waste Management Unit

Table 2: Soil Sampling and Analyses Summary – PRL 354

Sample Location	EPA ID	Sample Depth (feet bgs)	Sampling Technique	Analyte Group and Analytical Method[a]	
				PAHs 8270SIM	Lead 6010
HA1	LW038	0 to 0.2	Disposable Hand Trowel and HA	x	x
*HA1**	LW051	0.5 to 1	Disposable Hand Trowel and HA	x	
HA2	LW039	0 to 0.2	Disposable Hand Trowel and HA	x	x
*HA2**	LW052	0.5 to 1	Disposable Hand Trowel and HA	x	x
HA3	LW040	0 to 0.2	Disposable Hand Trowel and HA	x	x
*HA3**	LW053	0.5 to 1	Disposable Hand Trowel and HA	x	x
HA6	LW041	0 to 0.2	Disposable Hand Trowel and HA	x	x
*HA6**	LW054	0.5 to 1	Disposable Hand Trowel and HA		x
HA7	LW042	0 to 0.2	Disposable Hand Trowel and HA		x
HA9	LW043	0 to 0.2	Disposable Hand Trowel and HA	x	x
*HA9**	LW056	0.5 to 1	Disposable Hand Trowel and HA	x	
HA10	LW044	0 to 0.2	Disposable Hand Trowel and HA	x	x
HA11	LW045	0 to 0.2	Disposable Hand Trowel and HA	x	x
HA12	LW046	0 to 0.2	Disposable Hand Trowel and HA	x	x
HA13	LW047	0 to 0.2	Disposable Hand Trowel and HA		x
HA14	LW048	0 to 0.2	Disposable Hand Trowel and HA		x
HA15	LW049	0 to 0.2	Disposable Hand Trowel and HA	x	x
*HA15**	LW062	0.5 to 1	Disposable Hand Trowel and HA	x	
HA16	LW050	0 to 0.2	Disposable Hand Trowel and HA	x	x
*HA16**	LW063	0.5 to 1	Disposable Hand Trowel and HA	x	x

Notes:
* represents the deeper locations where concentrations of lead/and or PAHs were reported above residential PRG values in the surface soil samples
[a] Analysis was in general accordance with the listed methods provided in EPA Publication SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.

EPA Environmental Protection Agency
HA hand auger
ID identification
PRL potential release location
SI Site Inspection
X analysis was performed for the specified analyte

Table 3: Analytical Results Summary - PRL 354

Analyte	Residential Soil PRG[a]	Sample Location	HA1	HA1*	HA2	HA2*	HA3	HA3*	HA6	HA6*	HA7	HA9	HA9*	HA10	HA11	HA12	HA13	HA14	HA15	HA15*	HA16	HA16*
		Sample Depth	0 to 0.2	0.5 to 1	0 to 0.2	0.5 to 1	0 to 0.2	0.5 to 1	0 to 0.2	0.5 to 1	0 to 0.2	0 to 0.2	0.5 to 1	0 to 0.2	0 to 0.2	0 to 0.2	0 to 0.2	0 to 0.2	0 to 0.2	0.5 to 1	0 to 0.2	0.5 to 1
		EPA ID	LW038	LW051	LW039	LW052	LW040	LW053	LW041	LW054	LW042	LW043	LW056	LW044	LW045	LW046	LW047	LW048	LW049	LW062	LW050	LW063
Polynuclear Aromatic Hydrocarbons (µg/kg)																						
Acenaphthene	3.7E+06		12	82 J	280	19 J	42	10 J	5.1 U	NA	NA	14	5.6 J	2.3 J	5 U	5.2 U	NA	NA	23	5.9 J	13	7.8 J
Acenaphthylene	--		1.6 J	2.1 J	4.9 J	5.1 UJ	1.2 J	1.1 J	5.1 U	NA	NA	5 U	1.2 J	5 U	5 U	5.2 U	NA	NA	5.2 U	5.4 UJ	77	66 J
Anthracene	2.2E+07		15	80 J	71	19 J	43	13 J	5.1 U	NA	NA	9.3	7.8 J	2.4 J	5 U	2.1 J	NA	NA	45	6.7 J	67	62 J
Benz(a)anthracene	6.2E+02		360	**840 J**	**1,800**	230 J	560	210 J	11	NA	NA	450	150 J	28	6.6	14 J	NA	NA	380	110 J	420	360 J
Benzo(a)pyrene	6.2E+01		**190**	**390 J**	**1,100**	**120 J**	**280**	**100 J**	6	NA	NA	**290**	**97 J**	34	4.2 J	5.2 J	NA	NA	**130**	**65 J**	**140**	**130 J**
Benzo(b)fluoranthene	6.2E+02		**840**	**2200 J**	**5300 J**	**650 J**	**1,100**	430 J	35 J	NA	NA	**1200**	500 J	82 J	16	27 J	NA	NA	**750**	250 J	**650**	**830 J**
Benzo(g,h,i)perylene	--		360	960 J	2,000	320 J	900	250 J	21	NA	NA	820	200 J	45	12	16 J	NA	NA	320	110 J	280	250 J
Benzo(k)fluoranthene[b]	3.8E+02		260	**2200 J**	**5500 J**	**670 J**	340	110 J	36 J	NA	NA	310	**520 J**	85 J	4.1 J	6.1 J	NA	NA	**770**	67 J	220	**850 J**
Chrysene[b]	3.8E+03		410	940 J	2,300	320 J	590	240 J	15	NA	NA	660	220 J	38	9.1	19 J	NA	NA	380	130 J	470	430 J
Dibenz(a,h)anthracene	6.2E+01		**99**	**230 J**	**690**	**87 J**	**220**	**66 J**	5.2	NA	NA	**210**	52 J	12	2.9 J	4.4 J	NA	NA	**86**	30 J	**92**	**70 J**
Fluoranthene	2.3E+06		290	960 J	1,400	240 J	410	180 J	12	NA	NA	360	150 J	31	7.6	31	NA	NA	500	110 J	530	360 J
Fluorene	2.7E+06		2.9 J	19 J	23	4.4 J J	9.7	2.4 J	5.1 U	NA	NA	3 J	1.5 J	5 U	5 U	5.2 U	NA	NA	7.7	1.7 J	11	6 J
Indeno(1,2,3-cd)pyrene	6.2E+02		290	**920 J**	**1,800**	290 J	**780**	240 J	16	NA	NA	**680**	170 J	37	10	14	NA	NA	290	91 J	280	180 J
2-Methylnaphthalene	--		2.8 J	5.6 J	20	2.3 J	3.8 J	1.6 J	5.1 U	NA	NA	2 J	0.99 J	5 U	5 U	5.2 U	NA	NA	4.3 J	1.1 J	2.2 J	2.3 J
Naphthalene[b]	1.7E+03		8.7	9.4 J	23	3.8 J	7.3	3.5 J	5.1 U	NA	NA	4.5 J	2.9 J	5 U	5 U	1 J	NA	NA	14	1.7 J	4.9 J	4.8 J
Phenanthrene	--		67	390 J	270	78 J	160	53 J	4.2 J	NA	NA	41	37 J	11	3.1 J	21	NA	NA	200	30 J	190	94 J
Pyrene	2.3E+06		340	1000 J	1700	270 J	540	210 J	13	NA	NA	450	170 J	34	8.5	25	NA	NA	490	120 J	610	480 J
Metals (mg/kg)																						
Lead[b]	1.5E+02		73.7 J	NA	**219 J**	**332 J**	**179 J**	60.2 J	**188 J**	**221 J**	80 J	8.9 J	NA	18.8 J	36.1 J	27 J	8.8 J	43 J	27.6 J	NA	**168 J**	**157 J**

Notes

* The deeper samples shown in italics were analyzed, as concentrations of lead and PAHs were reported above residential PRG values in the surface samples analyzed.

Concentrations in **bold font** indicate values greater than the residential soil PRGs.

[a] Analytical results were compared to EPA Region 9 PRGs (2004a), with the exception of benzo(k)fluoranthene, chrysene, and naphthalene (see note b)

[b] Analytical results for benzo(k)fluoranthene, chrysene, naphthalene, and lead were compared to California-modified PRGs (2004a) because they are significantly more protective than the corresponding EPA Region 9 PRGs

An hazard quotient for lead could not be determined because the PRGs for lead were developed using the blood-lead levels and a reference dose is not available

-- = value does not exist

µg/kg= micrograms per kilogram

EPA = Environmental Protection Agency

ID = identification

J = indicates an estimated value

mg/kg = milligrams per kilogram

PRG = preliminary remediation goal

PRL = potential release location

U= indicates the compound or analyte was analyzed for but was not detected at or above the stated limit

UJ = indicates the compound or analyte was analyzed for but was not detected; and the sample detection limit is an estimated value

Table 4: Risk Screening Results - PRL 354

Constituent	Maximum Concentration	95% UCL	Method	Resonable Maxiumum EPC	Carcinogenic PRG[a]	Noncarcinogenic PRG[a]	Risk Corresponding to Resonable Maximum EPC			
							Carcinogenic		Noncarcinogenic	
							Excess Cancer Risk[b]	Percent Contribution to Cancer Risk[c]	HI[d]	Percent Contribtion to Noncancer Hazard[c]
Polynuclear Aromatic Hydrocarbons (µg/kg)										
Acenaphthene	280	62.83	95% Chebyshev (MVUE) UCL	62.83	--	3.7E+06	--	--	1.7E-05	2.8%
Anthracene	80	51.12	95% Approximate Gamma UCL	51.12	--	2.2E+07	--	--	2.3E-06	0.4%
Benzo(a)anthracene	**1,800**	683.8	95% Approximate Gamma UCL	**683.8**	6.2E+02	--	1.1E-06	6%	--	--
Benzo(a)pyrene	**1,100**	355	95% Approximate Gamma UCL	**355**	6.2E+01	--	5.7E-06	30%	--	--
Benzo(b)fluoranthene	**5,300**	1738	95% Approximate Gamma UCL	**1738**	6.2E+02	--	2.8E-06	15%	--	--
Benzo(k)fluoranthene*	**5,500**	1735	95% Approximate Gamma UCL	**1735**	3.8E+02	--	4.6E-06	24%	--	--
Chrysene*	2,300	819.2	95% Approximate Gamma UCL	819.2	3.8E+03	--	2.2E-07	1%	--	--
Dibenz(a,h)anthracene	**690**	226.6	95% Approximate Gamma UCL	**226.6**	6.2E+01	--	3.6E-06	19%	--	--
Fluoranthene	1,400	619	95% Approximate Gamma UCL	619	--	2.3E+06	--	--	2.7E-04	44.5%
Fluorene	19	10.12	95% Approximate Gamma UCL	10.12	--	2.7E+06	--	--	3.7E-06	0.6%
Indeno(1,2,3-cd)pyrene	**1,800**	699	95% Approximate Gamma UCL	**699**	6.2E+02	--	1.1E-06	6%	--	--
Naphthalene*	23	9.2	95% Approximate Gamma UCL	9.2	1.7E+03	--	5.4E-09	0%	--	--
Pyrene	1,700	726.3	95% Approximate Gamma UCL	726.3	--	2.3E+06	--	--	3.1E-04	51.7%
Metals (mg/kg)										
Lead*	332	157.1	95% Approximate Gamma UCL	157.1	--	--	--	--	--	--
					Cumulative Maximum Risk		**2.E-05**		**0.0006**	

Notes:

Statistical evalution has been performed using ProUCL version 4.0

Concentrations in **bold font** indicate values greater than the residential soil PRGs.

[a] United States EPA Region 9 PRGs (2004a)

[b] Excess cancer risk = 1E-06 x (EPC/Carcinogenic PRG)

[c] With respect to cumulative excess cancer risk or hazard index

[d] HI = EPC / Noncarcinogenic PRG

* = Analytical results for benzo(k)fluoranthene, chrysene, naphthalene, and lead were compared to California-modified PRGs (2004a) because they are significantly more protective than the corresponding EPA Region 9 PRGs

An HI for lead could not be determined because the PRGs for lead were developed using the blood-lead levels and a reference dose is not available.

-- = value does not exist

µg/kg= micrograms per kilogram

EPA = Environmental Protection Agency

EPC = exposure point concentration

HI = hazard index

mg/kg = milligrams per kilogram

PRG = preliminary remediation goal

PRL = potential release location

Table 5: Benzo(a)Pyrene Equivalent Calculations - PRL 354

Sample Location	Sample Depth	EPA ID	Benzo(a)pyrene (µg/kg)	Benzo(a)pyrene B(a)P Equivalent	Benz(a)anthracene (µg/kg)	Benz(a)anthracene B(a)P Equivalent	Benzo(b)fluoranthene (µg/kg)	Benzo(b)fluoranthene B(a)P Equivalent	Benzo(k)fluoranthene (µg/kg)	Benzo(k)fluoranthene B(a)P Equivalent	Chrysene (µg/kg)	Chrysene B(a)P Equivalent	Dibenz(a,h)anthracene (µg/kg)	Dibenz(a,h)anthracene B(a)P Equivalent	Indeno(1,2,3-cd)pyrene (µg/kg)	Indeno(1,2,3-cd)pyrene B(a)P Equivalent	Total B(a)P Equivalent	Risk
PEF				1		0.1		0.1		0.1		0.01		1.1		0.1		
HA1	0 to 0.2	LW038	190	190	360	36	840	84	260	26	410	4.1	99	108.9	290	29	478.00	7.7E-06
*HA1**	0.5 to 1	LW051	390	390	840	84	2200	220	2200	220	940	9.4	230	253	920	92	1268.40	2.0E-05
HA2	0 to 0.2	LW039	1,100	1100	1,800	180	5,300	530	5,500	550	2,300	23	690	759	1,800	180	3322.00	5.3E-05
*HA2**	0.5 to 1	LW052	120	120	230	23	650	65	670	67	320	3.2	87	95.7	290	29	402.90	6.5E-06
HA3	0 to 0.2	LW040	280	280	560	56	1,100	110	340	34	590	5.9	220	242	780	78	805.90	1.3E-05
*HA3**	0.5 to 1	LW053	100	100	210	21	430	43	110	11	240	2.4	66	72.6	240	24	274.00	4.4E-06
HA6	0 to 0.2	LW041	6	6	11	1.1	35	3.5	36	3.6	15	0.15	52	5.72	16	1.6	21.67	3.5E-07
HA9	0 to 0.2	LW043	290	290	450	45	1200	120	310	31	660	6.6	210	231	680	68	791.60	1.3E-05
*HA9**	0.5 to 1	LW056	97	97	150	15	500	50	520	52	220	2.2	52	57.2	170	17	290.40	4.7E-06
HA10	0 to 0.2	LW044	34	34	28	2.8	82	8.2	85	8.5	38	0.38	12	13.2	37	3.7	70.78	1.1E-06
HA11	0 to 0.2	LW045	4.2	4.2	6.6	0.66	16	1.6	4.1	0.41	9.1	0.091	2.9	3.19	10	1	11.15	1.8E-07
HA12	0 to 0.2	LW046	5.2	5.2	14	1.4	27	2.7	6.1	0.61	19	0.19	4.4	4.84	14	1.4	16.34	2.6E-07
HA15	0 to 0.2	LW049	130	130	380	38	750	75	770	77	380	3.8	86	94.6	290	29	447.40	7.2E-06
*HA15**	0.5 to 1	LW062	65	65	110	11	250	25	67	6.7	130	1.3	30	33	91	9.1	151.10	2.4E-06
HA16	0 to 0.2	LW050	140	140	420	42	650	65	220	22	470	4.7	92	101.2	280	28	402.90	6.5E-06
*HA16**	0.5 to 1	LW063	130	130	360	36	830	83	850	85	430	4.3	70	77	180	18	433.30	7.0E-06

95% UCL calculated using the Pro UCL Software by 95% Approximate Gamma UCL Method (including outliers)	1068
Risk based on 95% UCL of the B(a)P Equivalents (including outliers)	**2.E-05**
95% UCL calculated using the Pro UCL Software by 95% Student's-t UCL Method	550.5
Risk based on the maximum concentration of B(a)P Equivalents (excluding an outlier)	**9.E-06**

Notes:

PEFs are based on the updated Technical Support Document dated May 2005 (OEHHA 2005)

The PEF for dibenz(a,h)anthracene was calculated using the ratio of inhalation unit risk for dibenz(a,h)anthracene and benzo(a)pyrene as per the 2005 OEHHA document.

µg/kg =micrograms per kilogram

B(a)P= Benzo(a)pyrene

bgs = below ground surface

EPA = Environmental Protection Agency

ID = identification

MCAS = Marine Corps Air Station

PEF = potency equivalency factor

PRL = potential release location

Figures

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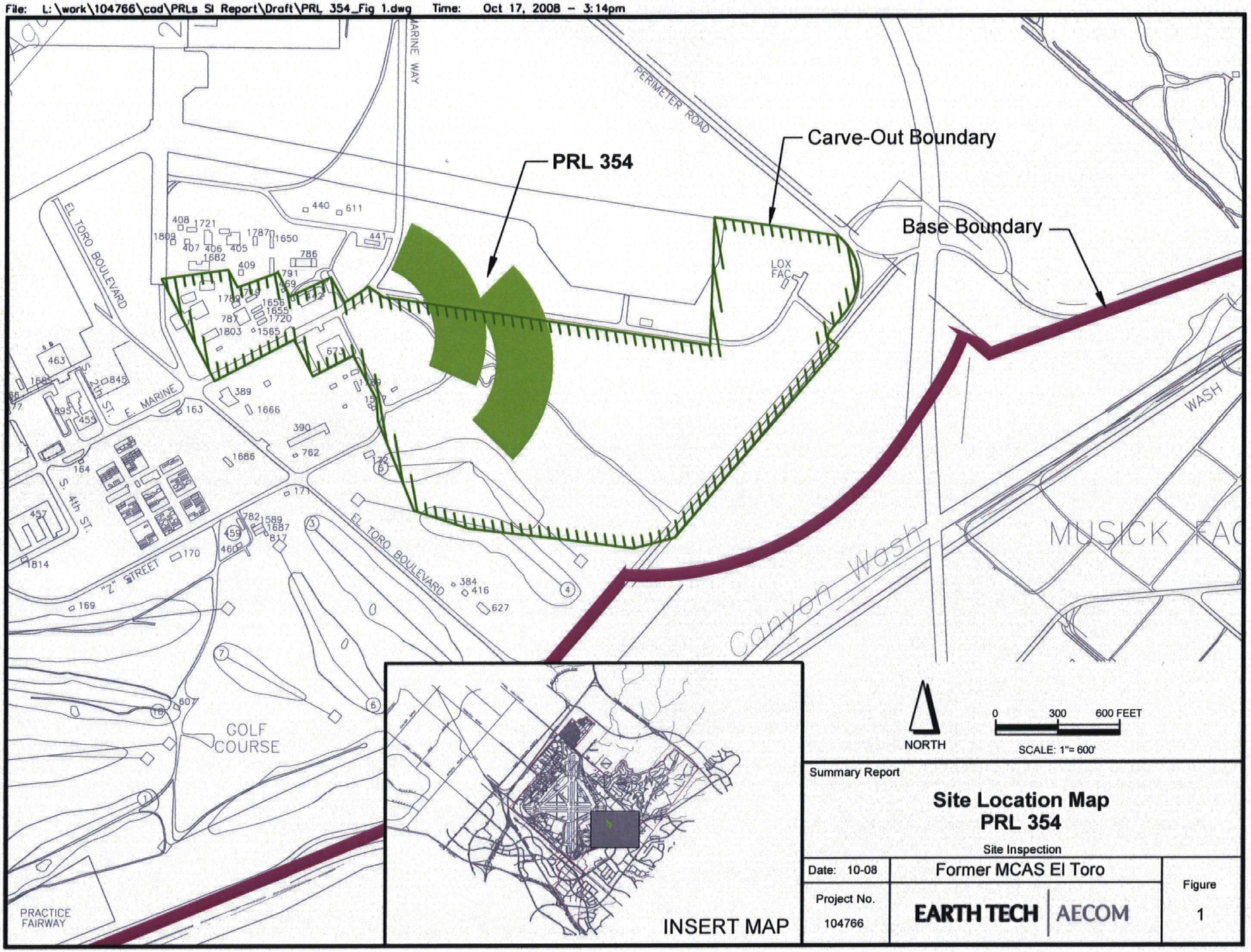
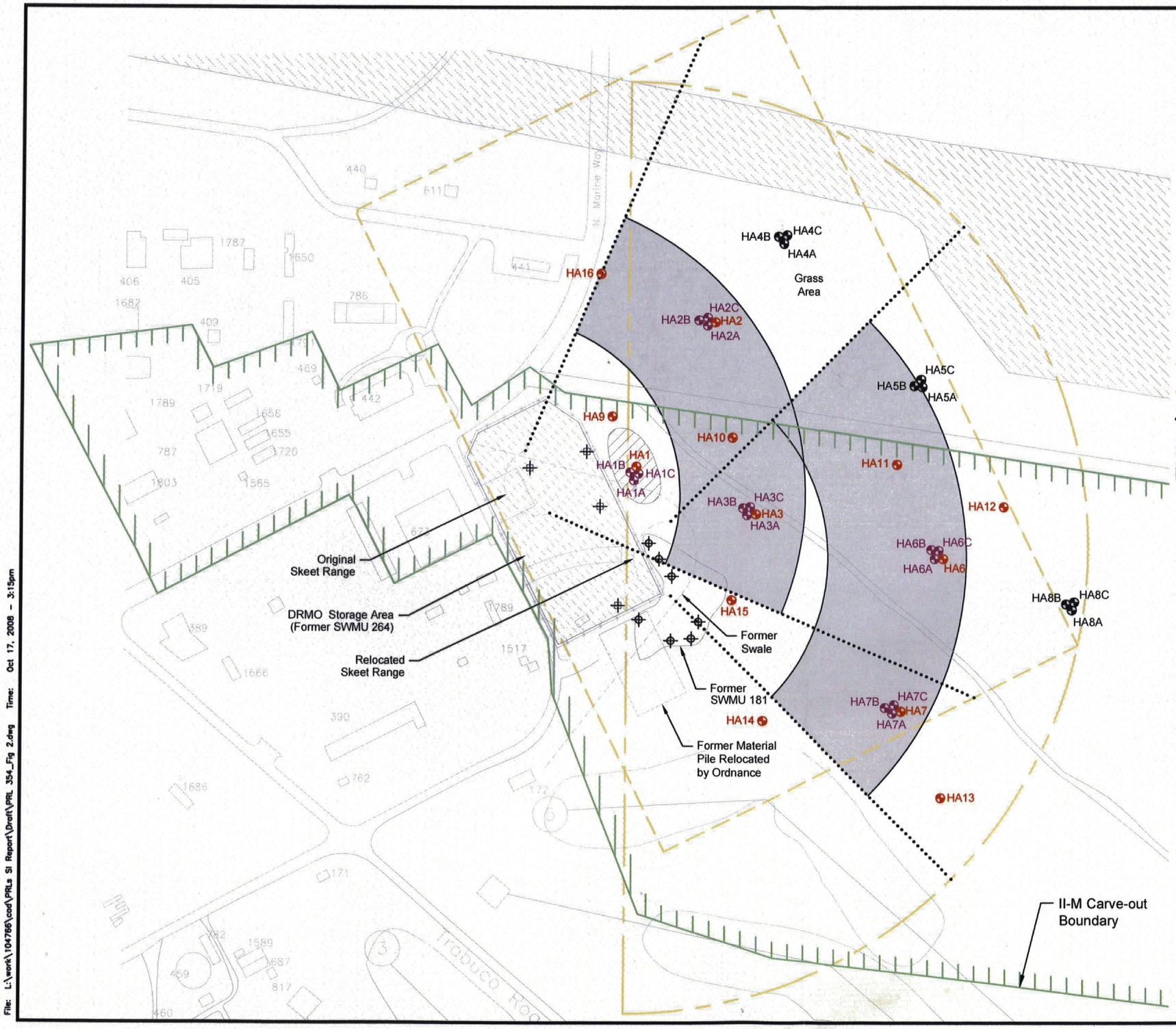


Summary Report

Site Location Map
PRL 354

Site Inspection

Date: 10-08	Former MCAS El Toro	Figure
Project No. 104766	EARTH TECH | AECOM	1



LEGEND:

- Fence line
- Carve-out Boundary
- HA4A — Composite Soil Sample Location Less than the Residential PRG/MCAS El Toro Background Values (Earth Tech June 05)
- HA2B — Composite Soil Sample Location Greater than the Residential PRG/MCAS El Toro Background Values (Earth Tech June 05)
- HA11 — Discrete Soil Sample Location (Earth Tech 2008) (Depth: 0-foot to 0.2-foot bgs; Analytes: Lead and PAHs; Except Locations HA7, HA13, and HA14 which were Analyzed for Lead Only). Deeper Soil Samples (0.5-foot to 1-foot bgs) were Analyzed at Locations HA1, HA2, HA3, HA6, HA9, HA15, and HA16 where Concentrations of Lead/and or PAH's were Reported Above Residential PRG Values.
- Asphalt Paved Area
- Original Skeet Range Boundary
- Relocated Skeet Range Boundary
- Estimated Boundary of Shot Fall Areas
- Area of Maximum Shot Fall
- Skeet Fragments Observed During Site Reconnaissance

Previous Investigation of LOCs:

- SWMU 181 Former Land Farming Area
  Approximate Soil Sample Location (NFECSW SDIEGO, 1993)
  (Sample Depth: 2 to 7 ft bgs; Analytes: TFH and VOCs)
- SWMU 264 Former DRMO Storage Yard Number 3
  Approximate Soil Sample Location (NFECSW SDIEGO, 1993)
  (Sample Depth: 2 to 5 ft bgs; Analytes: TPH and VOCs)

NORTH

0 100' 200 FEET

SCALE: 1"= 200'

Note: Features and interior layout are approximate and may not be to scale

Summary Report

Site Plan
PRL 354

Site Inspection

Date: 10-08	Former MCAS El Toro	Figure
Project No. 104766	EARTH TECH | AECOM	2

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Appendix A
Previous Soil Sampling Results

Table A-1: Analytical Results Summary - PRL 354

Analyte	MCAS El Toro Background Concentrations (95th Quantile)[a]	Residential Soil PRG[b]	Sample Location	PRL354- HA1	PRL354- HA2	PRL354- HA3	PRL354- HA4	PRL354- HA5	PRL354- HA6	PRL354- HA7	PRL354- HA8
			Sample Depth	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs
			EPA ID	LJ698	LJ699	LJ700	LJ701	LJ702	LJ703	LJ704	LJ705
			Sample Type	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite
Polynuclear Aromatic Hydrocarbons (µg/kg)											
Acenaphthene	--	3.7E+06		7 J	13 J	10 J	130 U	26 U	3 J	27 U	27 U
Anthracene	--	2.2E+07		12 J	8 J	15 J	130 U	26 U	4 J	27 U	27 U
Benzo(a)anthracene	--	6.2E+02		200	160	170	130 U	2 J	62	7 J	7 J
Benzo(a)pyrene	--	6.2E+01		**390**	**350**	**300**	130 U	4 J	**120**	16 J	11 J
Benzo(b)fluoranthene	--	6.2E+02		**570**	**440**	**430**	130 U	3 J	170	19 J	14 J
Benzo(g,h,i)perylene	--	--		340	320	270	7 J	4 J	84	14 J	9 J
Benzo(k)fluoranthene[c]	--	3.8E+02		**140**	**150**	**140**	130 U	1 J	37	7 J	5 J
Chrysene[c]	--	3.8E+03		300	210	230	130 U	4 J	87	10 J	10 J
Dibenz(a,h)anthracene	--	6.2E+01		**96 J**	**88 J**	**79 J**	19 J	4 J	**26 J**	6 J	5 J
Fluoranthene	--	2.3E+06		220	140	220	130 U	4 J	64	9 J	14 J
Fluorene	--	2.7E+06		130 U	130 U	130 U	130 U	26 U	0.8 J	27 U	27 U
Indeno(1,2,3-cd)pyrene	--	6.2E+02		**290**	**270**	**230**	7 J	4 J	75	11 J	8 J
Naphthalene[c]	--	1.7E+03		130 U	130 U	130 U	130 U	26 U	1 J	27 U	27 U
Phenanthrene	--	--		55 J	71 J	71 J	130 U	2 J	17 J	3 J	5 J
Pyrene	--	2.3E+06		260	240	240	5 J	5 J	78	11 J	15 J
Metals (mg/kg)											
Antimony	--	3.1E+01		0.46 J	1.9 J	0.96 J	0.66 J	0.31 J	1.6 J	0.81 J	5.3 U
Arsenic[c]	6.86	6.2E-02		3.4	4.2	3.7	4	3.2	5.2	6.6	4.3
Lead[c]	15.1	1.5E+02		*25.5*	**198**	**88.2**	14.4	8.6	**139**	**87.2**	*15.8*

Notes

Samples HA1 through HA8 were each composited from three discrete samples collected at depths of 0 - 0.2 feet bgs

Concentrations in **bold** indicate values greater than one third of residential soil PRGs.

Concentrations with *italic underline* indicate values less than one third of the residential soil PRG, but greater than the former MCAS El Toro background values

[a] Source: BNI 1996a and 1996b

[b] Analytical results were compared to EPA Region 9 PRGs (EPA 2004a)

[c] = Analytical results for arsenic, benzo(k)fluoranthene, chrysene, lead, and naphthalene were compared to California-modified PRGs (EPA 2004) because they are significantly more protective than the corresponding EPA Region 9 PRGs

-- = value does not exist

% = percent

µg/kg = micrograms per kilogram

bgs = below ground surface

BNI = Bechtel National, Inc.

EPA = Environmental Protection Agency

ID = identification

J = indicates an estimated value

MCAS = Marine Corps Air Station

mg/kg = milligrams per kilogram

PRG = preliminary remediation goal

PRL = potential release location

U = Indicates the compound or analyte was analyzed for but was not detected at or above the stated limit.

UCL = upper confidence limit

Table A-1: Analytical Results Summary - PRL 354

Analyte	MCAS El Toro Background Concentrations (95th Quantile)[a]	Residential Soil PRG[b]	Sample Location	PRL354- HA4A	PRL354- HA4B	PRL354- HA4C	PRL354-HA5A	PRL354-HA5B	PRL354-HA5C	PRL354-HA7A	PRL354-HA7B	PRL354-HA7C	PRL354-HA8A	PRL354-HA8B	PRL354-HA8C
			Sample Depth	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs	0-0.2 feet bgs
			EPA ID	LJ683	LJ684	LJ685	LJ686	LJ687	LJ688	LJ692	LJ693	LJ694	LJ695	LJ696	LJ697
			Sample Type	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
Metals (mg/kg)															
Arsenic[c]	6.86	6.2E-02		3.3	2.8	3.7	3.4	3.1	3	3.8	5	4.3	3.5	4.4	4.2
Lead[c]	15.1	1.5E+02		NA	NA	NA	NA	NA	NA	*52*	**152**	*83.7*	NA	NA	NA

Notes

Concentrations in **bold** indicate values greater than the residential soil PRGs and the former MCAS El Toro background values

Concentrations with *italic underline* indicate values less than the residential soil PRG, but greater than the former MCAS El Toro background values

[a] Source: BNI 1996

[b] Analytical results were compared to EPA Region 9 PRGs (EPA 2004a)

[c] = Analytical results for arsenic and lead were compared to California-modified PRGs (EPA 2004a) because they are significantly more protective than the corresponding EPA Region 9 PRGs

bgs = below ground surface

BNI = Bechtel National, Inc.

EPA = Environmental Protection Agency

ID = identification

MCAS = Marine Corps Air Station

mg/kg = milligrams per kilogram

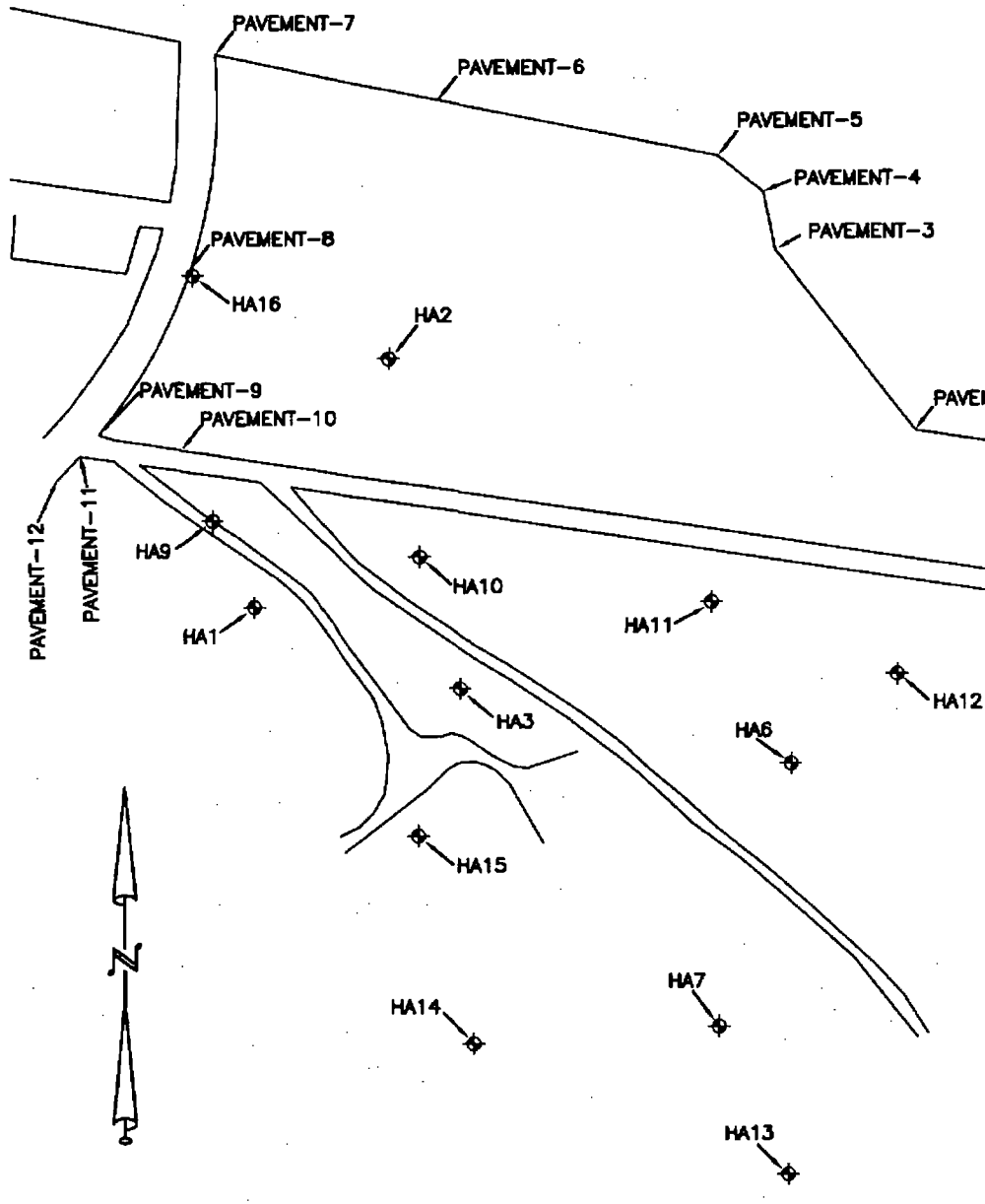
NA= not analyzed

PRG = preliminary remediation goal

PRL = potential release location

Appendix B
Land Surveying Data

PRL354-SKEET RANGE



PRL AND NOTABLE FEATURES LOCATIONS			
STATION	NORTHINGS	EASTINGS	ELEV.
PAVEMENT-1	2189410.18	6117090.13	418.05
PAVEMENT-2	2189445.76	6116861.24	414.62
PAVEMENT-3	2189655.06	6116700.20	412.86
PAVEMENT-4	2189721.78	6116686.64	412.64
PAVEMENT-5	2189763.87	6116634.50	411.20
PAVEMENT-6	2189829.50	6116316.14	404.17
PAVEMENT-7	2189882.61	6116056.10	398.27
PAVEMENT-8	2189637.52	6116028.59	396.44
PAVEMENT-9	2189444.05	6115921.37	393.25
PAVEMENT-10	2189426.33	6116017.92	394.47
PAVEMENT-11	2189419.16	6115899.25	392.60
PAVEMENT-12	2189391.74	6115873.02	391.96

PRL AND NOTABLE FEATURES LOCATIONS			
STATION	NORTHINGS	EASTINGS	ELEV.
HA1	2189244.56	6116103.06	395.58
HA2	2189531.62	6116259.81	400.58
HA3	2189149.66	6116341.45	400.58
HA6	2189060.90	6116718.40	407.69
HA7	2188757.51	6116634.55	405.32
HA9	2189342.10	6116048.89	394.29
HA10	2189302.08	6116294.82	399.83
HA11	2189248.49	6116626.23	406.77
HA12	2189164.00	6116840.92	411.13
HA13	2188586.06	6116713.57	406.06
HA14	2188739.01	6116355.66	400.68
HA15	2188978.96	6116293.86	399.19
HA16	2189628.18	6116030.05	396.24

DCA CIVIL ENGINEERING GROUP

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Torrance, California 90504
Tel: (310) 327-0018
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www.dcacivileng.com

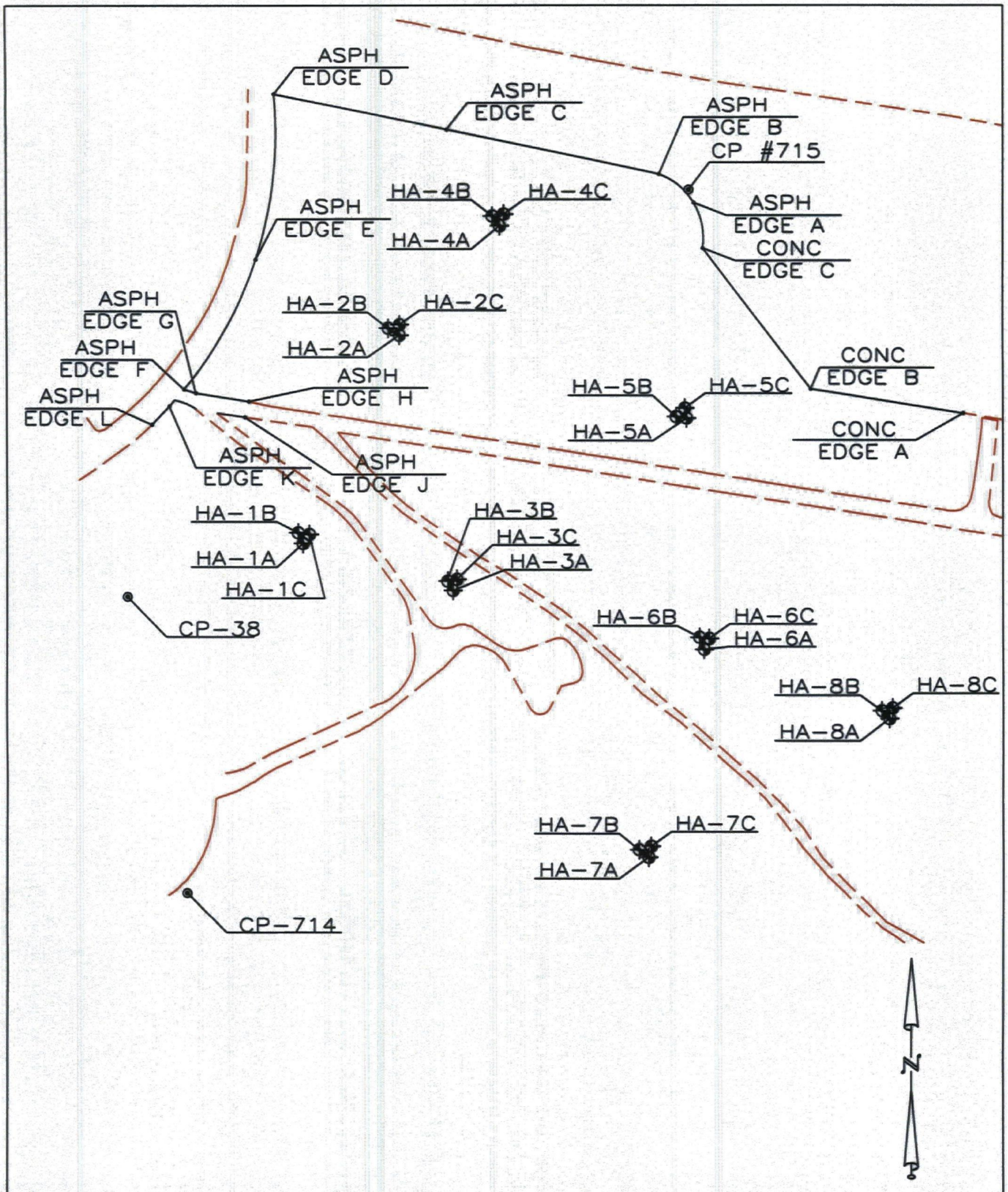
POTENTIAL RELEASE LOCATION SKETCH

SCALE: 1" = 200'

DATE: 05/30/2008

BY: ANK

JOB NO.: 04-1058-2227.000-1019



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POTENTIAL RELEASE LOCATION SKETCH
PRL #354

SCALE:	1"=200'	DATE:	07-01-05
BY:	JCL	JOB NO.:	04-1058-2227.000-535

BUILDING #354 PRL AND NOTABLE FEATURES LOCATIONS			
STATION	NORTHING	EASTING	ELEVATION
CONC EDGE A	2189410.184	6117090.133	
CONC EDGE B	2189445.765	6116861.239	
CONC EDGE C	2189655.063	6116700.203	
ASPH EDGE A	2189721.775	6116686.636	
ASPH EDGE B	2189763.888	6116634.505	
ASPH EDGE C	2189829.505	6116316.141	
ASPH EDGE D	2189882.615	6116056.098	
ASPH EDGE E	2189637.518	6116028.589	
ASPH EDGE F	2189444.053	6115921.366	
ASPH EDGE G	2189438.496	6115938.880	
ASPH EDGE H	2189426.329	6116017.924	
ASPH EDGE J	2189402.944	6116012.025	
ASPH EDGE K	2189419.158	6115899.245	
ASPH EDGE L	2189391.740	6115873.016	
CP-38	2189137.943	6115836.310	390.91
CP-714	2188699.132	6115924.881	390.87
CP-715	2189740.930	6116679.020	412.47
PRL 354-HA 1A	2189217.376	6116097.803	395.17
PRL 354-HA 1B	2189233.296	6116090.723	394.90
PRL 354-HA 1C	2189230.708	6116107.416	395.19
PRL 354-HA 2A	2189525.340	6116243.701	399.78
PRL 354-HA 2B	2189535.813	6116226.997	400.15
PRL 354-HA 2C	2189540.993	6116244.061	400.06
PRL 354-HA 3A	2189147.985	6116324.029	399.28
PRL 354-HA 3B	2189161.927	6116316.137	399.37
PRL 354-HA 3C	2189164.397	6116330.047	399.41
PRL 354-HA 4A	2189687.795	6116395.048	403.75
PRL 354-HA 4B	2189701.949	6116384.233	403.67
PRL 354-HA 4C	2189704.787	6116401.289	403.99
PRL 354-HA 5A	2189402.483	6116675.348	408.75
PRL 354-HA 5B	2189404.736	6116659.370	408.41
PRL 354-HA 5C	2189417.395	6116672.742	408.73
PRL 354-HA 6A	2189060.948	6116701.333	407.16
PRL 354-HA 6B	2189079.031	6116694.455	407.00
PRL 354-HA 6C	2189077.370	6116709.126	407.41
PRL 354-HA 7A	2188753.828	6116617.407	404.98
PRL 354-HA 7B	2188765.012	6116602.919	404.76
PRL 354-HA 7C	2188770.404	6116620.998	404.64
PRL 354-HA 8A	2188959.062	6116978.180	413.07
PRL 354-HA 8B	2188970.596	6116966.799	412.92
PRL 354-HA 8C	2188974.721	6116982.824	413.46

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POTENTIAL RELEASE LOCATION SKETCH
PRL #354

SCALE:	NONE	DATE:	07-01-05
BY:	JCL	JOB NO.:	04-1058-2227.000-535

Appendix C
DTSC's Lead Spreadsheet 7

LEAD RISK ASSESSMENT SPREADSHEET

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m³)	0.028
Lead in Soil/Dust (ug/g)	157.1
Lead in Water (ug/l)	2.5
% Home-grown Produce	7%
Respirable Dust (ug/m³)	1.5

OUTPUT							
	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	0.9	1.7	2.0	2.4	2.8	888	1274
BLOOD Pb, CHILD	2.7	4.9	5.8	7.1	8.0	209	311
BLOOD Pb, PICA CHILD	3.8	6.9	8.2	10.0	11.3	134	200
BLOOD Pb, OCCUPATIONAL	0.5	0.9	1.1	1.3	1.5	4562	6551

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.08	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	70.7	

Click here for REFERENCES

PATHWAYS						
ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.01	1%	1.4E-5	0.00	0%
Soil Ingestion	8.8E-4	0.14	15%	6.3E-4	0.10	19%
Inhalation, bkgrnd		0.05	5%		0.03	6%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.14	15%		0.14	28%
Food Ingestion, bkgrnd		0.22	23%		0.23	46%
Food Ingestion	2.4E-3	0.38	41%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.01	0%		0.01	0%
Soil Ingestion	7.0E-3	1.11	41%	1.4E-2	2.21	58%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	1%		0.04	1%
Water Ingestion		0.16	6%		0.16	4%
Food Ingestion, bkgrnd		0.50	19%		0.50	13%
Food Ingestion	5.5E-3	0.87	32%		0.87	23%

Appendix D
Outlier Test for Benzo(a)Pyrene Equivalent Concentrations

Outlier Tests for Selected Variables

User Selected Options

From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1

Dixon's Outlier Test for Benzo(a)Pyrene Equivalent

Number of data = 16
10% critical value: 0.454
5% critical value: 0.507
1% critical value: 0.595

1. Data Value 3322 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.762

For 10% significance level, 3322 is an outlier.
For 5% significance level, 3322 is an outlier.
For 1% significance level, 3322 is an outlier.

2. Data Value 11.15 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.013

For 10% significance level, 11.15 is not an outlier.
For 5% significance level, 11.15 is not an outlier.
For 1% significance level, 11.15 is not an outlier.

The benzo(a)pyrene equivalent calculations shown in Table 5 were used to run a statistical Dixon's outlier test using the ProUCL Version 4 program. The results show that the maximum value of benzo(a)pyrene equivalent concentration (3,322 µg/kg) associated with the surface sample collected at location HA2 was found to be a statistical outlier.

Attachment 3
Summary Report
PRL 354

Attachment 4
Summary Report
PRL 605

Summary Report for PRL 605, Site Inspection

FORMER MARINE CORPS AIR STATION EL TORO, CALIFORNIA

October 2008

Prepared for:
Base Realignment and Closure
Program Management Office West
San Diego, California

Prepared by:
Earth Tech, Inc.
841 Bishop Street, Suite 500
Honolulu, HI 96813-3920

Prepared under:
Naval Facilities Engineering Command
Contract Number N62742-03-D-1837
Contract Task Order 0032
DCN: ET-1837-0032-0001

CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

µg/kg	micrograms per kilogram
AOC	area of concern
bgs	below ground surface
BNI	Bechtel National, Inc.
BRAC	Base Realignment and Closure
CAMA	calcium acid methanearsonate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DSMA	disodium methanearsonate
DTSC	Department of Toxic Substances Control
EBS	Environmental Baseline Survey
EPA	Environmental Protection Agency
EPC	exposure point concentration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
HI	hazard index
ID	identification
LOC	location of concern
MCAS	Marine Corps Air Station
mg/kg	milligrams per kilogram
MSMA	monosodium methanearsonate
NFA	no further action
NAVFAC SW	Naval Facilities Engineering Command Southwest
OCHCA	Orange County Health Care Agency
OWS	oil-water separator
PCB	polychlorinated biphenyl
PRG	preliminary remediation goal
PRL	potential release location
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RWQCB	Regional Water Quality Control Board, Santa Ana Region
SI	Site Inspection
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TAA	temporary accumulation area
TPH	total petroleum hydrocarbons
TPH_d	TPH as diesel
TPH_g	TPH as gasoline
TPH_m	TPH as motor oil
UCL	upper confidence limit
UST	underground storage tank
VOC	volatile organic compound
X	analysis was performed for the specified analyte

1. Background

Potential Release Location (PRL) 605 is associated with Building 605 and is located in the northeast quadrant of former Marine Corps Air Station (MCAS) El Toro, California (Figure 1). The building was constructed in 1962, and identified as a Maintenance Hanger in 1973, which is the last known description. Figure 2 shows the plan of Building 605 and the surrounding area.

Eight locations of concern (LOCs), previously associated with this site, have already been closed, and are presented in Table 1.

Based on the review of available documentation, including similar activities of other Department of Defense installations, and a visual site inspection, it was assessed that a potential existed for releases of hazardous substances to the environment via the expansion joints between the floor slabs of the hangar and the aircraft washing area located northwest of the hangar. This assessment was based on past airplane maintenance and washing activities at the hangar, hazardous substances used in the hangar such as fuel, oil, lubricants and solvents, and odors of hydrocarbons observed along the northeast wall of the hangar and staining along the berm for the wash area.

Soil Sampling 2003. In concurrence with the regulatory agencies, soil sampling was conducted for PRL 605 in 2003 (Naval Facilities Engineering Command Southwest [NAVFAC SW] 2003a). Soil samples were collected from two locations, HA1 at a depth of 1.5 feet below ground surface (bgs), and HA2 at a depth of 2.0 feet bgs. Soil samples from both locations were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), and metals.

Arsenic was reported at a maximum concentration of 29.8 milligrams per kilogram (mg/kg) (7.0 mg/kg in the duplicate sample) in the soil sample from location HA2, which exceeded the residential preliminary remediation goal (PRG) (Environmental Protection Agency (EPA) 2004a) and background concentration (Bechtel National, Inc. [BNI] 1996). TPH as motor oil (TPH_m), TPH as diesel oil (TPH_d), and TPH as gasoline (TPH_g) were reported at maximum concentrations of 11 mg/kg (estimated) (HA2), 47 mg/kg (HA1), and 0.03 mg/kg (estimated) (HA1), respectively. SVOCs were not detected above laboratory reporting limits, and none of the VOCs exceeded their respective residential PRGs. Based on a review of the data and the types of activities conducted at the hangers, no further action was recommended since these concentrations are not indicative of a significant release (NAVFAC SW 2003a).

The analytical results for these soil samples are presented in Appendix A. These soil sample locations are shown on Figure 2.

Soil Sampling 2005. Pursuant to letters dated 11 April 2003 by EPA and the California Department of Toxic Substances Control (DTSC) recommending further investigation in the vicinity of location HA2, one soil sample was collected at location HA3 adjacent to HA2 (Earth Tech 2005). The soil sample was collected at a depth of 1.5 feet below the bottom of the floor slab by hand auger and analyzed for arsenic. Arsenic was reported at a concentration of 2.9 mg/kg at location HA3, which is less than former MCAS El Toro background value of 6.86 mg/kg. This result indicated that the arsenic concentration reported at location HA2 in 2003 was consistent with the range observed in the background evaluation and was not indicative of a release.

The analytical result for this soil sample is presented in Appendix A and the Group III Summary Report (Earth Tech 2005). This soil sample location is shown on Figure 2.

2. Site Inspection Soil Sampling Objectives

EPA concurred with the recommendation for no further action for PRL 605 in a letter dated 3 November 2005. However, the California DTSC recommended additional investigation to characterize the distribution of arsenic at location HA2 in a letter dated 3 February 2006.

Therefore, a judgmental sampling program based on previous sampling results was conducted to characterize the distribution of arsenic in soil at PRL 605. A summary of Site Inspection (SI) soil sampling activities is presented in Section 3, and the results are presented in Section 4.

3. Sampling and Analysis Summary

Sampling was conducted for PRL 605 in May 2008 in accordance with the *Final Site Inspection Work Plan, Potential Release Locations* (Work Plan) (Earth Tech 2008). The sample locations are shown on Figure 2 and a summary of sampling and analyses performed is provided in Table 2.

One soil sample was collected at location HA2 at a depth of 4 feet bgs to assess the vertical distribution of arsenic where a previous detection above the MCAS El Toro background has been reported (29.8 mg/kg [7 mg/kg in the duplicate sample] at 2 feet bgs).

Soil samples were collected from an additional four boreholes (HA3, HA4, HA5, and HA6) to assess the distribution of arsenic in the vicinity of location HA2. At each location, the samples were collected at two depths: 1.5 feet bgs and 4 feet bgs using direct push equipment, and analyzed for arsenic. The exception was location HA3 where one sample was collected from a depth of 4 feet bgs. A soil sample at a depth of 1.5 feet bgs at location HA3 had been collected during the 2005 investigation.

4. Investigation Results

This section presents analytical results and discusses the results of data evaluation and risk screening. The analytical results for the samples collected at PRL 605 along with the screening level of arsenic which is the MCAS El Toro background value per the Work Plan (Earth Tech 2008) are presented in Table 3. Appendix B presents the land surveying data.

4.1 Analytical Results and Quality Assurance

No results were qualified during data validation. The laboratory results are used as reported.

4.2 Results Evaluation and Risk Screening

4.2.1 Results Evaluation

Arsenic was reported at sampling location HA4 at a concentration of 16 mg/kg in the shallow soil sample at 1.5 feet bgs. The soil at this location was described as a poorly graded dark brown sand. The arsenic concentration at location HA6 (inside the building) was 228 mg/kg in the shallow soil sample collected at 1.5 feet bgs. This soil was characterized as a poorly graded yellowish sand with gravel (see Table 3). This sample was collected at a depth of 1.5 feet below the top of floor slab and within the top 8 inches of the foundation soil. These concentrations exceeded the former MCAS El Toro background value of 6.86 mg/kg. None of the reported concentrations of arsenic in the deeper soil samples (4 feet bgs) exceeded the former MCAS El Toro background value. Thus, these reported concentrations of arsenic at locations HA4 and HA6 are localized within the top foundation surface.

Based on a review of pre-construction boreholes at PRL 605 (see Table 4 and Figure 2), the material encountered before the construction of Building 605 is similar to the material encountered during the SI soil sampling. In addition, based on a review of construction drawings for Building 605, the top 11-inch concrete finished floor was at an elevation consistent with the existing/original grade. The drawings called for the top two feet of the native soil to be re-excavated and compacted. Based on the comparison of the lithology encountered during the SI and the descriptions from the preconstruction drawings there is no discernable difference in the soil encountered which suggests that no imported fill was required for construction.

The initial premise for evaluating this facility was the potential for the release of primarily hydrocarbons and to a lesser extent metals as a result of aircraft maintenance. Data collected during the 2005 investigation did not document a release of hydrocarbons at the location that had elevated arsenic. The hanger floors and examination of the concrete cores do not show evidence of staining or etching that would be indicative of a release. Therefore, the elevated arsenic concentrations do not appear to be associated with activities conducted at the hangar. The elevated concentrations of arsenic appear to be a pre-existing and localized condition and are not a result of aircraft maintenance activities conducted by the Marine Corps.

The presence of the arsenic does not represent a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) release which per CERCLA section 101(22) is defined as any "...spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant)....". The presence of elevated concentrations in only the top of the foundation suggests some form of surface application.

Use of registered organic arsenic based herbicides would have been legal and would not constitute a CERCLA release. The use of herbicides would not have been unexpected due to the foundation design and the required cast in place piles. To minimize the potential of damaging the piles, it is very likely that over-excavation and compaction of the foundation soil would have been completed prior to the installation of the piles. Over 50 piles were required, so there would have been a period ranging from two weeks to a month during which the compacted foundation would have potentially been open to the elements prior to the placement of the concrete slab on grade. It is therefore plausible that weeds/crabgrass may have started to germinate and some form of abatement would have been required.

Organical-arsenical herbicides such as monosodium methanearsonate (MSMA), disodium methanearsonate (DSMA), calcium acid methanearsonate (CAMA), cacodylic acid (dimethylarsinic acid), and cacodylic acid's sodium salt (sodium cacodylate) have been registered under Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) since the 1950's and 1960s. The legal us of these pesticides overlaps the period when Building 605 was constructed (i.e. 1962). CERCLA exempts from its reporting requirements the application of a pesticide product registered under FIFRA or the handling or storage of such product by an agricultural producer. However, accidents, spills, improper application, and improper disposal must be reported. Thus the source of the elevated concentrations of arsenic may be attributable to herbicide application.

4.2.2 Risk Screening

Risk screening was performed to evaluate risks associated with potential exposures to reported analytes in the soil at PRL 605. The methodology for risk screening is presented in Section 3.3 of the main text of the SI Report and results are presented in Table 5.

The first step in risk screening of arsenic was to estimate a reasonable maximum exposure point concentration (EPC) for arsenic, which corresponds to the highest exposure that is reasonably expected to occur at the site. The value of reasonable maximum EPC was estimated for arsenic by calculating the 95 percent upper confidence limit (UCL) of the mean concentration, and comparing it with its maximum reported concentration; the lesser of the two values (95 percent UCL and maximum detected concentration) was then used as the reasonable maximum EPC for arsenic. The 95 percent UCL of the mean concentration of arsenic at PRL 605 was estimated using the ProUCL program that is based on the EPA (2002) guidance document. Arsenic concentrations do not follow lognormal distribution; therefore, the 99 percent Chebyshev UCL method described in the EPA guidance document was used for the 95-percent-UCL calculation. The 95 percent UCL of the mean concentration of arsenic using this method was estimated to be 228.7 mg/kg, which is greater than the maximum reported concentration of 228 mg/kg. Therefore, the value of reasonable maximum EPC for arsenic was estimated to be 228 mg/kg.

The cumulative carcinogenic risk (based on data from the 2005 and 2008 investigations) due to potential exposure to the maximum reported concentrations of the constituents analyzed at PRL 605 is $4x10^{-3}$, which exceeds the EPA point of departure risk level of 10^{-6} and the risk level (10^{-4}) typically associated with remediation requirements. The maximum EPC for arsenic (228 mg/kg) accounts for nearly 100 percent of the cancer risk.

The cumulative noncancer hazard associated (based on data from the 2005 and 2008 investigations) with potential exposure to the maximum reported concentrations of the constituents analyzed is expressed as a hazard index (HI) of 12.1, which is greater than the background HI of 2.5. The maximum EPC for arsenic (228 mg/kg) accounts for nearly 87 percent of the noncancer HI.

4.2.3 Risk Uncertainties

It should be noted that this value of the cumulative carcinogenic risk and the noncancer hazard discussed above is likely an overestimation of cancer risk and the noncancer hazard across the whole site and is not representative of actual site risk. This is because the maximum reported concentration of arsenic was used as the reasonable maximum EPC in the calculation of cancer risk and the noncancer hazard. A statistical analysis conducted using Dixon's Extreme Value test indicates that the arsenic concentration of 228 mg/kg is a statistical outlier. The Dixon's outlier test was conducted using the ProUCL Version 4 program and the results are presented in Appendix C.

The ten soil samples (excluding the outlier) analyzed at PRL 605 have an average arsenic concentration of 6.7 mg/kg with a standard deviation of 9.2 mg/kg. Arsenic concentrations (excluding the outlier) followed lognormal distribution; therefore, the 95 percent Chebyshev UCL method described in the EPA guidance document was used for the 95-percent-UCL calculation. The 95 percent UCL of the mean concentration of arsenic using this method was estimated to be 14.6 mg/kg, which is less than the maximum reported concentration of 228 mg/kg. Therefore, the value of reasonable maximum EPC for arsenic was estimated to be 14.6 mg/kg, which is comparable with the statistically derived background value of 6.86 mg/kg (which is based on the 95th quantile) and the maximum reported concentration of 8.5 mg/kg (BNI 1996).

If the sample with 228 mg/kg of arsenic is excluded, the reported concentration range for arsenic during the SI soil sampling is 1.2 mg/kg to 16 mg/kg (see Table 3). The use of 14.6 mg/kg as reasonable maximum EPC results in the cancer risks ($2x10^{-4}$) that are in the same range as background ($1x10^{-4}$), and the cumulative noncancer hazard is reduced to 2.3 which is less than the background HI of 2.5.

5. Conclusions and Recommendations

The primary objective of investigations conducted at PRL 605 was to assess whether a release of hazardous substances or pollutants into the environment has occurred due to aircraft maintenance activities conducted by the Marine Corps. A review of available records, visual site inspections, and soil sampling were conducted for this assessment. One soil sample collected in 2003 contained arsenic in excess of the former MCAS El Toro background. Subsequent sampling was conducted in 2005 to confirm this result and delineate the potential soil distribution. The reported arsenic concentration in the subsequent sample at location HA3 was 2.9 mg/kg, which was less than the former MCAS El Toro background value of 6.86 mg/kg. However, the California DTSC recommended additional investigation to characterize the distribution of arsenic at location HA2 in a letter dated 3 February 2006.

Subsequent samples were collected in 2008 to characterize the distribution of arsenic. Arsenic was reported at a concentration of 16 mg/kg and 228 mg/kg in the shallow soil samples (1.5 feet bgs) collected at location HA4 (adjacent to the building) and HA6 (inside the building), respectively. Both of these samples exceeded the former MCAS El Toro background value of 6.86 mg/kg. None of the reported concentrations of arsenic in the deeper soil samples (4 feet bgs) exceeded the former MCAS El Toro background value. A statistical analysis conducted using Dixon's outlier test indicates that the maximum reported concentration of arsenic of 228 mg/kg reported during the 2008 investigation is a statistical outlier. A risk screening was conducted for the samples analyzed at PRL 605 using the estimated arsenic reasonable maximum EPC of 14.6 mg/kg and the maximum reported concentrations of other constituents analyzed. The estimated cancer risk at PRL 605 is comparable with the background risk and the noncancer hazard at this PRL is less than the background HI.

The initial objective for evaluating this facility was to assess the potential for the release of primarily hydrocarbons and to a lesser extent metals as a result of aircraft maintenance. Data collected during these investigations did not document a release of hydrocarbons or other expected constituents. In addition, there was no visual evidence of staining or etching that would be indicative of a release.

The arsenic concentrations exceeding the former MCAS El Toro background are not attributable to Marine Corps aircraft maintenance activities and appears to reflect conditions prior to the start of operations at the hangar. The presence of elevated arsenic concentrations in only the top of the foundation suggests some form of surface application. Use of registered organic arsenic based herbicides would have been legal and would not constitute a CERCLA release.

Based on the above finding, a no further investigation is recommended for the potential releases associated with the aircraft maintenance activities. However, upon transfer the new land owner will be notified about the presence of these localized elevated arsenic concentrations. The notification will also state that these herbicides containing arsenic appear to have been legally applied and do not represent a CERCLA release.

6. References

Bechtel National, Inc. (BNI). 1996. *Final Technical Memorandum, Background and Reference Levels, Remedial Investigations, Marine Corps Air Station El Toro, California.* San Diego, CA: NAVFAC EFD SOUTHWEST.

Earth Tech, Inc. (Earth Tech). 2005. *Summary Report for Group III Potential Release Locations, Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. October.

_____. 2008. *Final Site Inspection Work Plan, Potential Release Locations, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. May.

Environmental Protection Agency (EPA), United States. 2002. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites.* Office of Emergency and Remedial Response. OSWER 9285.6-10. Washington, D.C. December.

———. 2004a. *EPA Region 9 PRGs* [Preliminary Remediation Goals] *Tables.* San Francisco, CA. October.

———. 2004b.*SW-846 On-Line, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm. Office of Solid Waste.

———. 2006. *Guidance for the Data Quality Objectives Process. EPA QA/G-4.* EPA/240/B-06/001. Office of Environmental Information. August.

Naval Facilities Engineering Command Southwest (NAVFAC SW). 1993. *Marine Corps Air Station El Toro, California, Installation Restoration Program, Final Resource Conservation Recovery Act (RCRA), Facility Assessment Report, Volume I.* San Diego, CA. July.

———. 2003a. *Draft Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* San Diego, CA. February.

———. 2003b. *Final Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* San Diego, CA. September.

Shaw Environmental, Inc. 2003. Closure Report, Former Temporary Accumulation Area 605, Former Marine Corps Air Station El Toro, California. November.

Tables

Table 1: Locations of Concern – PRL 605

LOC Name	Description	Action	Status	Concurrence
OWS 605C (SWMU/AOC 151)	OWS	Removed	NFA	OCHA, 9 December 1999
PCB T81	Pad mounted transformer that contained PCBs	Replaced with a non-PCB transformer. Assigned an Environmental Condition of Property category of 1* (NAVFAC SW 2003b)	NFA	DTSC, 25 September 2003 EPA, 25 September 2003
RFA 14	Drum fuel storage area	Investigated, RCRA Facility Assessment	NFA	RWQCB, 31 March 2000
RFA 150	Aircraft wash area	Investigated, 1995 EBS	NFA	BRAC Team, 23 July 1996
RFA 267	Drop tank fuel storage area near Building 605	Investigated, 1995 EBS	NFA	DTSC, 23 July 1996
TAA 605 (SWMU/AOC 149)	Less than 90 day TAA	Closed	NFA	DTSC, 13 September 2004
UST 605A	UST	Removed	NFA	RWQCB, 9 December 1999
UST 605B	UST	Removed	NFA	OCHA, 9 December 1999

Notes:
*Areas where no release or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)
AOC = area of concern
BRAC = Base Realignment and Closure
DTSC = Department of Toxic Substances Control
EBS = Environmental Baseline Survey
EPA = Environmental Protection Agency
LOC = location of concern
NAVFAC SW = Naval Facilities Engineering Command Southwest
NFA = no further action
OCHA = Orange County Health Care Agency
OWS = oil/water separator
PCB = polychlorinated biphenyl
PRL = potential release location
RCRA = Resource Conservation and Recovery Act
RFA = RCRA Facility Assessment
RWQCB = Regional Water Quality Control Board, Santa Ana Region
SWMU = Solid Waste Management Unit
TAA = temporary accumulation area
UST = underground storage tank

Table 2: Soil Sampling and Analyses Summary – PRL 605

Sample Location	EPA ID	Sample Depth (feet bgs)	Sampling Technique	Analyte Group and Analytical Method[a]
				Arsenic 6010B
HA2	LW064	4	Direct Push	X
HA3	LW065	4	Direct Push	X
HA4	LW066	1.5	Direct Push	X
HA4	LW067	4	Direct Push	X
HA5	LW068	1.5	Direct Push	X
HA5	LW069	4	Direct Push	X
HA6	LW070	1.5	Direct Push	X
HA6	LW071	4	Direct Push	X

Notes:
[a] Analysis was in general accordance with the listed methods provided in EPA Publication SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.

bgs below ground surface
EPA Environmental Protection Agency
ID identification
PRL potential release location
SI Site Inspection
X analysis was performed for the specified analyte

Table 3: Analytical Results Summary – PRL 605

Sample Location	EPA ID	Sample Depth (feet bgs)	Description of Lithology	Arsenic Concentration (mg/kg) (6.86 mg/kg)[a] (0.062 mg/kg)[b]
HA2	LW064	4	Poorly graded, medium to coarse sand, dark brown, loose.	1.5
HA3	LW065	4	Poorly graded, fine to medium grain, dark brown, loose.	1.2
HA4	LW066	1.5	Poorly graded, fine to medium grain moist, dark brown, loose.	**16**
HA4	LW067	4	Poorly graded, fine to medium grain moist, dark brown, loose, trace gravel.	2
HA5	LW068	1.5	Poorly graded, fine-medium grain, trace gravel, dark brown moist, loose.	2.9
HA5	LW069	4	Poorly graded, fine to medium grain trace clay conglomerate, dark brown, loose.	2.9
HA6	LW070	1.5	Poorly graded, coarse sand, 30 percent gravel, angular, yellow, moist, loose.	**228**
HA6	LW071	4	Poorly graded, sand, fine to medium, dark blackish brown, moist, loose trace silt.	4.4

Notes:
[a] Screening Level as per the *Final SI Work Plan* (Earth Tech 2008), which is the former MCAS El Toro background value.
[b] California-modified PRG (EPA 2004a).

bgs below ground surface
BNI Bechtel National, Inc.
EPA Environmental Protection Agency
ID identification
MCAS Marine Corps Air Station
mg/kg milligrams per kilogram
PRG preliminary remediation goal
PRL potential release location
SI Site Inspection

Table 4: Pre-Construction Borehole Lithology

Borehole Location	Sample Depth (feet below ground surface)	Description of Lithology
10	0 to 22	Silty sand – fine considerable amount of silt, brown
	22 to 26	Silt – sandy, non-plastic, dark grayish brown
	26 to 30	Silty sand – fine considerable amount of silt, brown
	30 to 32	Silty sand – fine considerable amount of silt, small amount of clay, brown
	32 to 40	Silty sand – fine to medium, small amount of silt, brown
11	0 to 4	Sand – fine to medium, poorly graded, slightly silty, brown
	4 to 18	Silty sand – medium, small amount of silt, brown
	18 to 20	Clayey sand – fine, small amount of clay, brown
	20 to 50	Silty sand – fine, large amount of silt, brown
12	0 to 8	Silty sand – medium, small amount of silt, light brown
	8 to 12	Gravelly sand – well graded, large amount of gravel, tan
	12 to 13	Silty sand – fine, large amount of silt, dark brown
	13 to 20	Sand – fine to medium, poorly graded, slightly silty, tan
	20 to 32	Clay – lean, sandy, brown
	32 to 40	Silty sand – fine, small amount of silt, occasional gravel, brown

Source: Record Drawings Sheet C-3, Marine Corps Air Station, El Toro Aircraft Maintenance Hangars (Buildings 605/606), Site Development Plan Part II, 10 September 1965.

Table 5: Risk Screening Results - PRL 605

Constituent	MCAS El Toro Background Concentrations (95th Quantile)[a]	Calculated Resonable Maximum EPC*	Calculated Resonable Maximum EPC - excluding the outlier	Carcinogenic PRG[b]	Noncarcinogenic PRG[b]	Risk Corresponding to Resonable Maximum EPC				Risk Corresponding to Reasonable Maximum EPC (excluding the outlier)				Risk Corresponding to Background			
						Carcinogenic		Noncarcinogenic		Carcinogenic		Noncarcinogenic		Carcinogenic		Noncarcinogenic	
						Excess Cancer Risk[c]	Percent Contribution to Cancer Risk[d]	HI[e]	Percent Contribution to Noncancer Hazard[d]	Excess Cancer Risk[c]	Percent Contribution to Cancer Risk[d]	HI[e]	Percent Contribution to Noncancer Hazard[d]	Excess Cancer Risk[f]	Percent Contribution to Cancer Risk[g]	HI[h]	Percent Contribution to Noncancer Hazard[g]
Volatile Organic Compounds (µg/kg)																	
Acetone	–	46	46	–	1.4E+07	–	–	3.3E-06	0.0%	–	–	3.3E-06	0.0%	–	–	–	–
Methylene Chloride	–	1	1	9.1E+03	2.0E+06	1.1E-10	0.0%	5.1E-07	0.0%	1.1E-10	0.0%	5.1E-07	0.0%	–	–	–	–
Metals (mg/kg)																	
Aluminum	14,800	12,600	12,600	–	7.6E+04	–	–	1.7E-01	1.4%	–	–	1.7E-01	7.0%	–	–	1.9E-01	7.8%
Arsenic[i]	6.86	**228**	**14.6**	6.2E-02	2.2E+01	3.7E-03	100.0%	1.1E+01	86.7%	2.4E-04	99.9%	6.7E-01	28.7%	1.1E-04	99.9%	3.2E-01	12.7%
Barium	173	158	158	–	5.4E+03	–	–	2.9E-02	0.2%	–	–	2.9E-02	1.3%	–	–	3.2E-02	1.3%
Cadmium	2.35	0.35	0.35	1.4E+03	3.7E+01	2.5E-10		9.5E-03	0.1%	2.5E-10		9.5E-03	0.4%	1.7E-09	0.0%	6.3E-02	2.5%
Calcium	46,000	7,530	7,530	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Chromium	26.9	24.2	24.2	2.1E+02	–	1.1E-07	0.0%	–	–	1.1E-07	0.0%	–	–	1.3E-07	0.1%	–	–
Cobalt	6.98	30.7	30.7	9.0E+02	1.4E+03	3.4E-08	0.0%	2.2E-02	0.2%	3.4E-08	0.0%	2.2E-02	0.9%	7.7E-09	0.0%	5.1E-03	0.2%
Copper	6.41	12.6	12.6	–	3.1E+03	–	–	4.0E-03	0.0%	–	–	4.0E-03	0.2%	–	–	2.0E-03	0.1%
Iron	18,400	17,700	17,700	–	2.3E+04	–	–	7.5E-01	6.2%	–	–	7.5E-01	32.1%	–	–	7.8E-01	31.3%
Lead[i]	15.1	8.9	8.9	–	1.5E+02	–	–	–	–	–	–	5.9E-02	–	–	–	–	–
Magnesium	8,370	6,630	6,630	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Manganese	291	223	223	–	1.8E+03	–	–	1.3E-01	1.0%	–	–	1.3E-01	5.4%	–	–	1.7E-01	6.6%
Mercury	0.22	0.026	0.026	–	2.3E+01	–	–	1.1E-03	0.0%	–	–	1.1E-03	0.0%	–	–	9.4E-03	0.4%
Nickel	15.3	11.6	11.6	–	1.6E+03	–	–	7.4E-03	0.1%	–	–	7.4E-03	0.3%	–	–	9.8E-03	0.4%
Potassium	4,890	4,650	4,650	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Vanadium	71.8	38.6	38.6	–	7.8E+01	–	–	4.9E-01	4.1%	–	–	4.9E-01	21.0%	–	–	9.2E-01	36.7%
Zinc	77.9	52.6	52.6	–	2.3E+04	–	–	2.2E-03	0.0%	–	–	2.2E-03	0.1%	–	–	3.3E-03	0.1%
				Cumulative Maximum Risk		**4.E-03**		**12.1**		**2.E-04**		**2.3**		**1.E-04**		**2.5**	

Notes:

Concentrations in **bold font** indicates values greater than the screening level.

*The maximum reported concentrations of analytes have been used as resonable maximum EPC, except for arsenic for which the 95% UCL concentration has been estimated using the ProUCL Version 4.

[a] Source: BNI 1996

[b] United States EPA Region 9 PRGs (2004a)

[c] Excess cancer risk = 1E-06 x (EPC/Carcinogenic PRG)

[d] With respect to cumulative excess cancer risk or hazard index

[e] HI = EPC / Noncarcinogenic PRG

[f] Excess cancer risk = 1E-06 x (MCAS El Toro Background Concentration/Carcinogenic PRG)

[g] With respect to cumulative excess cancer risk or hazard index

[h] HI = MCAS El Toro Background Concentration / Noncarcinogenic PRG

[i] Cal-modified Carcingenic PRGs (2004a) were used for arsenic for excess cancer risk calculations because they are significantly more protective than the corresponding EPA Region 9 PRGs
An hazard quotient for lead could not be determined because the PRGs for lead were developed using the blood-lead levels and a reference dose is not available

– = value does not exist

µg/kg = micrograms per kilogram

BNI = Bechtel National, Inc.

EPA = Environmental Protection Agency

EPC = exposure point concentration

HI = hazard index

MCAS = Marine Corps Air Station

mg/kg = milligrams per kilogram

PRG = preliminary remediation goal

PRL = potential release location

Figures

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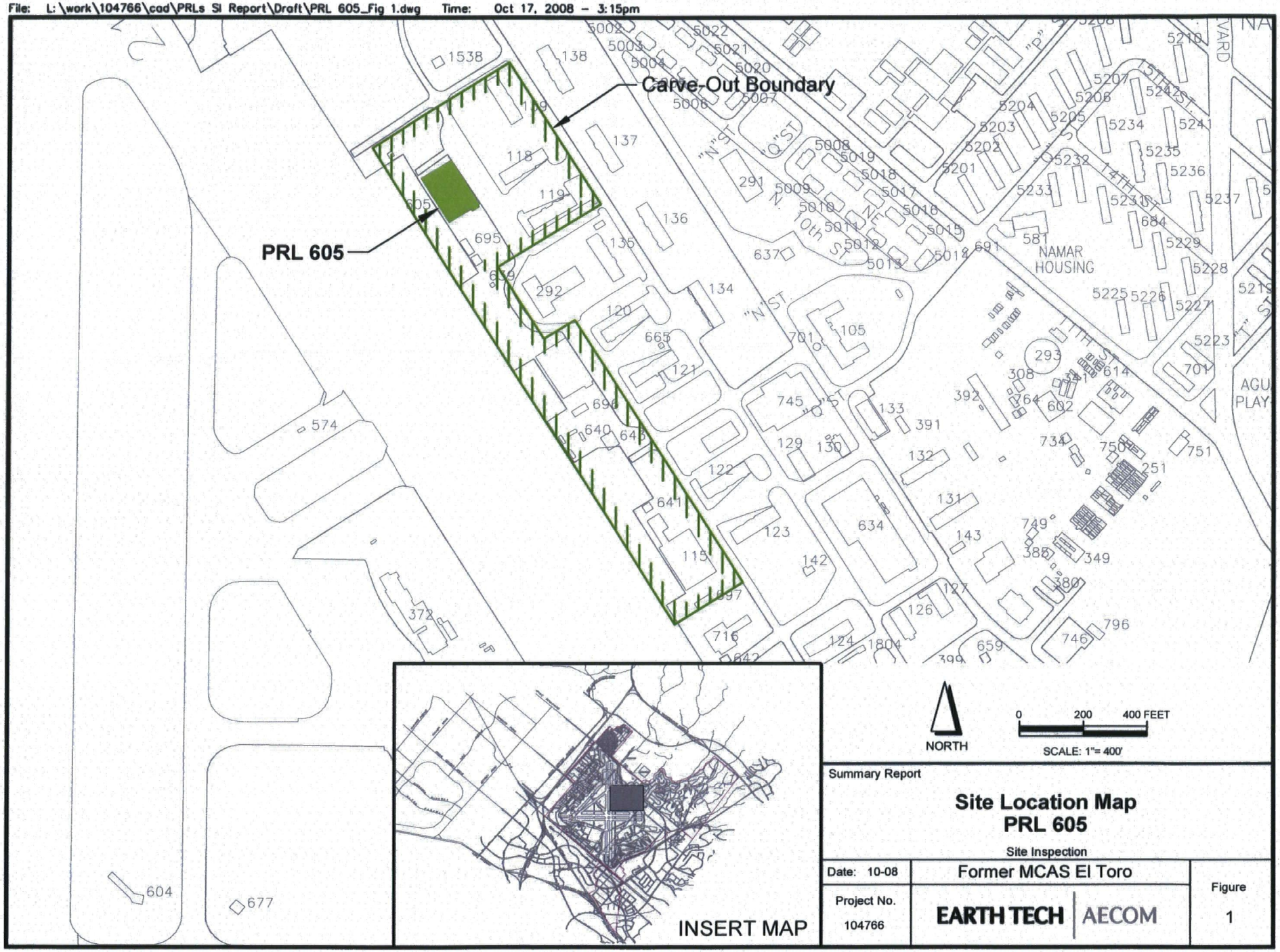

Summary Report

Site Location Map
PRL 605

Site Inspection

Date: 10-08	Former MCAS El Toro	Figure
Project No. 104766	EARTH TECH | AECOM	1

Front of Building (Facing East)

Northeast Corner of Hanger
(Facing South)

LEGEND:

- Edge of Road
- Carve-out Boundary
- Approximate 1993 Sample Location (NAVFAC SW 1993) (Analytes: TPH, VOCs, SVOCs, Pesticides, PCBs, and Metals)
- Approximate 2000 Sample Location (Shaw 2003) (Analytes: TPH, VOCs, SVOCs, Pesticides, and Metals)
- HA2 ⊕ 2003 Sample Location (NAVFAC SW 2003) (Sample Depth: 0.5 to 2 feet bgs; Analytes: TPH, VOCs, SVOCs, and Metals)
- HA3 Soil Sample Location (Earth Tech 2005) (Sample Depth: 1.5 feet bgs; Analytes: Arsenic)
- HA4 Soil Sample Location (Earth Tech 2008) (Sample Depth: 1.5 ft and 4 ft bgs; Analytes: Arsenic). In addidtion, Soil Samples were Collected at 4 ft bgs at Locations HA2 and HA3, and Analyzed for Arsenic
- Preconstruction Borehole Location

NORTH

0 15' 30 FEET

SCALE: 1" = 30'

Note: Features and interior layout are approximate and may not be to scale

Summary Report

Site Plan
PRL 605
Site Inspection

Date: 10-08	Former MCAS El Toro	Figure
Project No. 104766	EARTH TECH | AECOM	2

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Appendix A
2005 Soil Sampling Results

Table A-1: Analytical Results Summary - PRL 605

Analyte	MCAS El Toro Background Concentrations (95th Quantile)[a]	Residential Soil PRG[b]	Sample Location	PRL605-HA1	PRL605-HA2	PRL605-HA2	PRL605-HA3
			Sample Depth	0.5-1.5 feet bgs	1-2 feet bgs	1-2 feet bgs (dup)	1.5 feet bgs
			EPA ID	LJ112	LJ111	LJ114	LJ557
Total Petroleum Hydrocarbons (mg/kg)							
TPH as Gasoline	--	--		12 U	5 J	11 J	NA
TPH as Diesel	--	--		47	11 U	12 U	NA
TPH as Motor Oil	--	--		0.03 J	10 U	9.2 U	NA
Volatile Organic Compounds (µg/kg)							
Acetone	--	1.4E+07		46 J	91 U	97 U	NA
Methylene Chloride	--	9.1E+03		1 J	4.5 U	4.8 U	NA
Metals (mg/kg)							
Aluminum	14,800	7.6E+04		12,600	8,920	10,400	NA
Arsenic[c]	6.86	6.2E-02		3.6	**29.8**	**7.0**	2.9
Barium	173	5.4E+03		158	78.9	136	NA
Cadmium	2.35	3.7E+01		0.16 UJ	0.3 UJ	0.35	NA
Calcium	46,000	--		3,450	3,390	7,530	NA
Chromium	26.90	2.1E+02		12.2	24.2	12.1	NA
Cobalt	6.98	9.0E+02		*8.2*	*30.7*	*9.6*	NA
Copper	10.5	3.1E+03		6.8	*12.6*	6.7	NA
Iron	18,400	2.3E+04		17,700 J	15,400 J	14,800 J	NA
Lead[c]	15.1	1.5E+02		3.2	8.9	5.6	NA
Magnesium	8,370	--		6,630 J	4,950 J	5,680 J	NA
Manganese	291	1.8E+03		221 J	208 J	223 J	NA
Mercury	0.22	2.3E+01		0.026	0.014	0.025	NA
Nickel	15.3	1.6E+03		6.7	11.6	7.7	NA
Potassium	4,890	--		4,650 J	3,120 J	3,110 J	NA
Vanadium	71.8	7.8E+01		38.6	33.4	32.6	NA
Zinc	77.9	2.3E+04		52.6	42.4	43.4	NA

Notes

Concentrations in **bold** indicate values greater than the residential soil PRGs and the MCAS El Toro background values

Concentrations with *italic underline* indicate values greater than the MCAS El Toro background, but less than the residential soil PRGs

[a] Source: BNI 1996

[b] Analytical results were compared to EPA Region 9 PRGs (EPA 2004a)

[c] Analytical results for arsenic and lead were compared to California-modified PRGs (EPA 2004a) because they are significantly more protective than the corresponding EPA Region 9 PRGs

Location HA3 was sampled during this investigation (2005), and all other locations were sampled during the 2003 investigation

-- = value does not exist

µg/kg = micrograms per kilogram

bgs = below ground surface

BNI = Bechtel National, Inc.

EPA = Environmental Protection Agency

ID = identification

J = indicates an estimated value

MCAS = Marine Corps Air Station

mg/kg = milligrams per kilogram

NA = not analyzed

PRG = preliminary remediation goal

PRL = potential release location

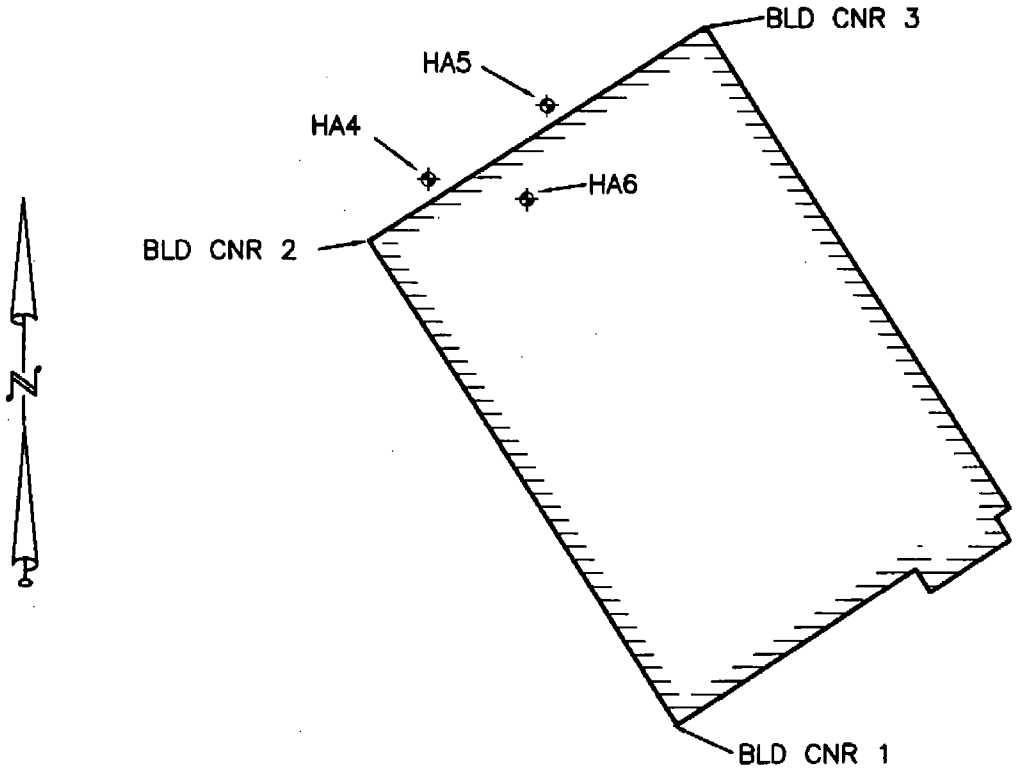
TPH = total petroleum hydrocarbons

U= indicates the compound or analyte was analyzed for but was not detected at or above the stated limit

UJ= indicates the compound or analyte was analyzed for but was not detected. The sample detection limit is an estimated value

Appendix B
Land Surveying Data

PRL605-BLD.605

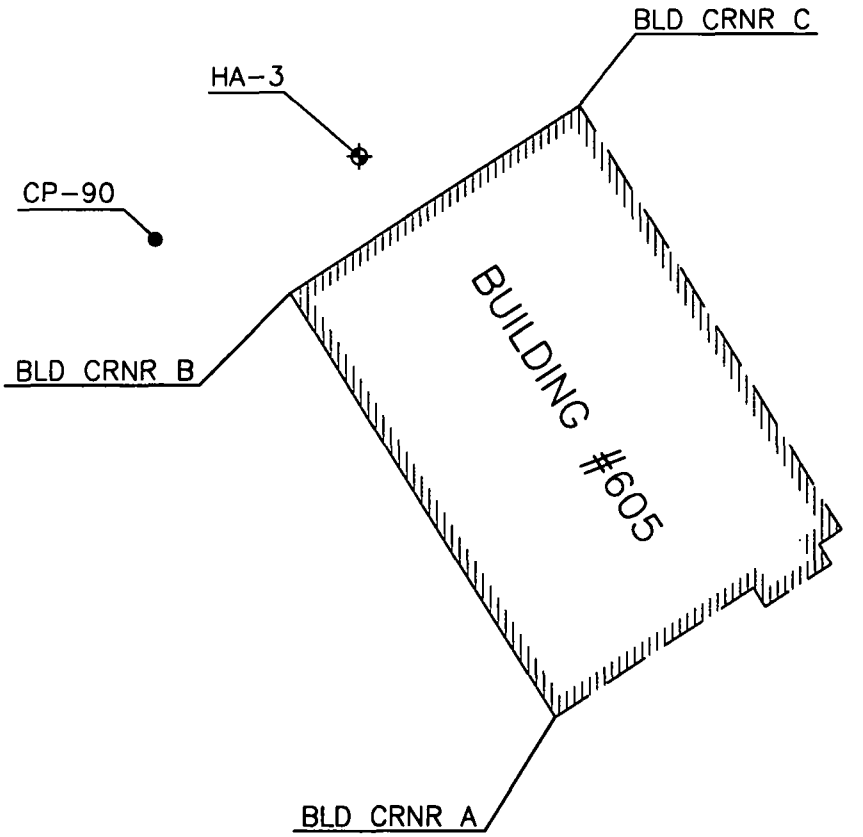


PRL AND NOTABLE FEATURES LOCATIONS			
STATION	**NORTHINGS**	**EASTINGS**	**ELEV.**
BLD CNR 1	2194146.47	6113398.66	386.24
BLD CNR 2	2194283.34	6113311.68	386.22
BLD CNR 3	2194344.38	6113407.61	386.26
HA4	2194300.80	6113328.63	386.12
HA5	2194321.65	6113362.57	386.20
HA6	2194295.13	6113356.69	386.41

DCA CIVIL ENGINEERING GROUP
17625 Crenshaw Blvd., Ste. 300
Torrance, California 90504
Tel: (310) 327-0018
Fax: (310)327-0175
www.dcacivileng.com

POTENTIAL RELEASE LOCATION SKETCH

SCALE: 1"= 50'	DATE: 05/30/2008
BY: ANK	JOB NO.: 04-1058-2227.000-1019



BUILDING #605 PRL AND NOTABLE FEATURES LOCATIONS			
STATION	NORTHING	EASTING	ELEVATION
BLD CRNR A	2194146.47	6113398.66	
BLD CRNR B	2194283.34	6113311.67	
BLD CRNR C	2194344.38	6113407.61	
CP 90	2194300.87	6113267.81	385.74
BLD 605-HA 3	2194327.81	6113334.71	385.91

DCA CIVIL ENGINEERING GROUP
17625 Crenshaw Blvd., Ste. 300
Torrance, California 90504
Tel: (310) 327-0018
Fax: (310)327-0175
www.dcacivileng.com

POTENTIAL RELEASE LOCATION SKETCH
BUILDING #605

SCALE:	1"=60'	DATE:	06-06-05
BY:	JCL	JOB NO.:	04-1058-2227.000-535

Appendix C
Outlier Test for Arsenic Concentrations

User Selected Options
From File
Full Precision
Test for Suspected Outliers with Dixon test
Test for Suspected Outliers with Rosner test

Dixon's Outlier Test for Arsenic

Number of data = 11
10% critical value: 0.517
5% critical value: 0.576
1% critical value: 0.679

1. Data Value 228 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.936

For 10% significance level, 228 is an outlier.
For 5% significance level, 228 is an outlier.
For 1% significance level, 228 is an outlier.

2. Data Value 1.2 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.028

For 10% significance level, 1.2 is not an outlier.
For 5% significance level, 1.2 is not an outlier.
For 1% significance level, 1.2 is not an outlier.

The analytical results for arsenic presented in Table 3 were used to run a statistical Dixon's outlier test using the ProUCL Version 4 program. The results show that the maximum reported value of arsenic concentration (228 mg/kg) associated with the surface sample collected at location HA6 is a statistical outlier.

Attachment 5
Summary Report
PRL 606

Summary Report for PRL 606, Site Inspection

FORMER MARINE CORPS AIR STATION EL TORO, CALIFORNIA

October 2008

Prepared for:
Base Realignment and Closure
Program Management Office West
San Diego, California

Prepared by:
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Prepared under:
Naval Facilities Engineering Command
Contract Number N62742-03-D-1837
Contract Task Order 0032
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ACRONYMS AND ABBREVIATIONS

AOC	area of concern
bgs	below ground surface
BNI	Bechtel National, Inc.
BRAC	Base Realignment and Closure
CAMA	calcium acid methanearsonate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DSMA	disodium methanearsonate
DTSC	Department of Toxic Substances Control
EBS	Environmental Baseline Survey
EPA	Environmental Protection Agency
EPC	exposure point concentration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
HI	hazard index
ID	identification
J	indicates an estimated value
LOC	location of concern
MCAS	Marine Corps Air Station
mg/kg	milligrams per kilogram
MSMA	monosodium methanearsonate
NFA	no further action
NAVFAC SW	Naval Facilities Engineering Command Southwest
PCB	polychlorinated biphenyl
PRG	preliminary remediation goal
PRL	potential release location
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RWQCB	Regional Water Quality Control Board, Santa Ana Region
SI	Site Inspection
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TAA	temporary accumulation area
TPH	total petroleum hydrocarbons
UCL	upper confidence limit
UST	underground storage tank
VOC	volatile organic compound
X	analysis was performed for the specified analyte

1. Background

Potential Release Location (PRL) 606 is associated with Building 606 and is located in the northeast quadrant of former Marine Corps Air Station (MCAS) El Toro, California (Figure 1). The building was constructed in 1965 over an area which was formerly occupied by Building 116 which was used for administrative purposes. Building 606 was identified as a Maintenance Hanger in 1973, which is the last known description. Figure 2 shows the plan of Building 606 and the surrounding area.

Four locations of concern (LOCs), previously associated with this site, have already been closed, and are presented in Table 1.

Based on the review of available documentation, including similar activities of other Department of Defense installations, and a visual site inspection, it was assessed that a potential existed for releases of hazardous substances to the environment via the expansion joints between the floor slabs of the hangar and the drainage ditch along the southeast side of the hangar. This assessment was based on past airplane maintenance and washing activities at the hangar; and hazardous substances used in the hangar such as fuel, oil, lubricants and solvents.

Soil Sampling 2003. Soil sampling was conducted for PRL 606 in 2003 (Naval Facilities Engineering Command Southwest [NAVFAC SW] 2003a). Soil samples were collected at locations HA1 and HA2 at depths of 1.5 feet below ground surface (bgs), and 2.0 feet bgs. Soil samples from both locations were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), and metals.

Arsenic was reported at concentrations of 6.9 and 11.1 milligrams per kilogram (mg/kg) in the soil samples collected at locations HA1 and HA2, respectively. The 2004 residential carcinogenic preliminary remediation goal (PRG) and the El Toro background concentration for arsenic are 0.062 and 6.86 mg/kg, respectively. VOCs and SVOCs were not detected above laboratory reporting limits. TPH as motor oil and diesel oil were reported at maximum concentrations of 18 mg/kg and 7 mg/kg (estimated values), respectively, at HA1. Based on a review of the data and the types of activities conducted at the hangers, no further action was recommended since these concentrations are not indicative of a significant release (NAVFAC SW 2003a). The analytical results for these soil samples are presented in Appendix A. These soil sample locations are shown on Figure 2.

In a letter dated 11 April 2003, the California Department of Toxic Substances Control (DTSC) recommended additional assessment to determine the distribution of arsenic in the vicinity of location HA2.

Soil Sampling 2005. Soil sampling was conducted for PRL 606 in May 2005. One soil sample was collected at location HA3 approximately 6-inches from location HA2. The soil sample was collected at a depth of 1.5 feet below the bottom of the floor slab by hand auger and analyzed for arsenic. Arsenic was reported at a concentration of 3.6 mg/kg at location HA3 which is less than former MCAS El Toro background value of 6.86 mg/kg (Bechtel National, Inc. [BNI] 1996). This result indicated that the arsenic concentration reported at location HA2 in 2003 was consistent with the range observed in the background evaluation and was not indicative of a release.

The analytical result for this soil sample is presented in Appendix A and the Group III Summary Report (Earth Tech 2005). This soil sample location is shown on Figure 2.

2. Site Inspection Soil Sampling Objectives

Environmental Protection Agency (EPA) concurred with the recommendation for no further action in a letter dated 3 November 2005. However, the California DTSC recommended additional investigation to characterize the distribution of arsenic at location HA2 in a letter dated 3 February 2006.

Therefore, a judgmental sampling program based on previous sampling results was conducted to characterize the distribution of arsenic in soil at PRL 606. A summary of Site Inspection (SI) soil sampling activities is presented in Section 3, and the results are presented in Section 4.

3. Sampling and Analysis Summary

Sampling was conducted for PRL 606 in May 2008 in accordance with the *Final Site Inspection Work Plan, Potential Release Locations* (Work Plan) (Earth Tech 2008). The sample locations are shown on Figure 2 and a summary of sampling and analyses performed is provided in Table 2.

One soil sample was collected at location HA2 at a depth of 4 feet bgs to assess the vertical distribution of arsenic where a previous detection above the MCAS El Toro background has been reported (11.1 mg/kg at 1 to 2 feet bgs).

Soil samples were collected from an additional four boreholes (HA3, HA4, HA5, and HA6) to assess the distribution of arsenic in the vicinity of location HA2. At each location, the samples were collected at two depths: 1.5 feet bgs and 4 feet bgs using direct push equipment, and analyzed for arsenic. The exception was location HA3 where one sample was collected from a depth of 4 feet bgs. A soil sample at a depth of 1.5 feet bgs at location HA3 had been collected during the 2005 investigation.

4. Investigation Results

This section presents analytical results and discusses the results of data evaluation and risk screening. The analytical results for the samples collected at PRL 606 along with the screening level of arsenic which is the MCAS El Toro background value per the Work Plan are presented in Table 3. Appendix B presents the land surveying data.

4.1 Analytical Results and Quality Assurance

One result, LW079 (location HA6 at 1.5 feet bgs), was qualified as estimated due to slight exceedances of matrix spike acceptance criteria. However, the results are usable as reported and no changes to the conclusions or recommendations are warranted.

4.2 Results Evaluation and Risk Screening

4.2.1 Results Evaluation

Arsenic was reported at concentrations of 231 mg/kg, 217 mg/kg, and 127 mg/kg in the shallow soil samples collected at locations HA4, HA5, and HA6 (all inside the building), respectively, which exceeded the former MCAS El Toro background value of 6.86 mg/kg. These samples were collected at a depth of 1.5 feet below the top of floor slab and within the top 8 inches of the foundation soil. None of the reported concentrations of arsenic in the deeper soil samples (4 feet bgs) exceeded the former MCAS El Toro background value. Thus, these reported concentrations of arsenic are localized within the top of the foundation layer.

Based on a review of pre-construction boreholes at PRL 606 (see Table 4 and Figure 2), the material encountered before the construction of Building 606 is similar to the material encountered during the SI soil sampling. In addition, based on a review of construction drawings for Building 606, the top 11-inch concrete finished floor was at an elevation consistent with the existing/original grade. The drawings called for the top two feet of the native soil to be re-excavated and compacted. Based on the comparison of the lithology encountered during the SI and the descriptions from the pre-construction drawings there is no discernable difference in the soil encountered which suggests that no imported fill was required for construction.

The initial premise for evaluating this facility was the potential for the release of primarily hydrocarbons and to a lesser extent metals as a result of aircraft maintenance. Data collected during the 2005 investigation did not document a release of hydrocarbons at the location that had elevated arsenic. The hanger floors and examination of the concrete cores do not show evidence of staining or etching that would be indicative of a release. Therefore, the elevated concentrations of arsenic do not appear to be associated with activities conducted at the hangar. The elevated concentrations of arsenic appear to be a pre-existing and localized condition and are not a result of aircraft maintenance activities conducted by the Marine Corps.

The presence of the arsenic does not represent a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) release which per CERCLA section 101(22) is defined as any "...spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant)....". The presence of elevated concentrations in only the top of the foundation suggests some form of surface application.

Use of registered organic arsenic based herbicides would have been legal and would not constitute a CERCLA release. The use of herbicides would not have been unexpected due to the foundation design and the required cast in place piles. To minimize the potential of damaging the piles, it is very likely that over-excavation and compaction of the foundation soil would have been completed prior to the installation of the piles. Over 50 piles were required, so there would have been a period a ranging from two weeks to a month during which the compacted foundation would have potentially been open to the elements prior to the placement of the concrete slab on grade. It is therefore plausible that weeds/crabgrass may have started to germinate and some form of abatement would have been required.

Organical-arsenical herbicides such as monosodium methanearsonate (MSMA), disodium methanearsonate (DSMA), calcium acid methanearsonate (CAMA), cacodylic acid (dimethylarsinic acid), and cacodylic acid's sodium salt (sodium cacodylate) have been registered under Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) since the 1950's and 1960s. The legal us of these pesticides overlaps the period when Building 606 was constructed (i.e. 1965). CERCLA exempts from its reporting requirements the application of a pesticide product registered under FIFRA or the handling or storage of such product by an agricultural producer. However, accidents, spills, improper application, and improper disposal must be reported Thus the source of the elevated may be attributable to herbicide application.

4.2.2 Risk Screening

Risk screening was performed to evaluate risks associated with potential exposures to reported analytes in the soil at PRL 606. The methodology for risk screening is presented in Section 3.3 of the main text of the SI Report and results are presented in Table 5.

The eleven soil samples analyzed at PRL 606 have an average arsenic concentration of 55.3 mg/kg. The first step in risk screening of arsenic was to estimate a reasonable maximum exposure point concentration (EPC) for arsenic, which corresponds to the highest exposure that is reasonably expected to occur at the site. The value of reasonable maximum EPC was estimated for arsenic by calculating the 95 percent upper confidence limit (UCL) of the mean concentration, and comparing it with its maximum detected concentration; the lesser of the two values (95 percent UCL and maximum detected concentration) was then used as the reasonable maximum EPC for arsenic. The 95 percent UCL of the mean concentration of arsenic at PRL 606 was estimated using the ProUCL program that is based on the EPA (2002) guidance document. Arsenic concentrations do not follow log normal distribution; therefore, the 99 percent Chebyshev UCL method described in the EPA guidance document was used for the 95-percent-UCL calculation. The 95 percent UCL of the mean concentration of arsenic using this method was estimated to be 328.9 mg/kg, which exceeds the maximum reported concentration of 231 mg/kg. Therefore, the value of reasonable maximum EPC for arsenic was estimated to be 231 mg/kg.

The cumulative carcinogenic risk (based on data from the 2005 and 2008 investigations) due to potential exposure to the maximum reported concentrations of constituents analyzed at PRL 606 is $4x10^{-3}$, which is greater than the background risk of $1x10^{-4}$. The reasonable maximum EPC for arsenic (231 mg/kg) accounts for nearly 100 percent of the cancer risk.

The cumulative noncancer hazard associated (based on data from the 2005 and 2008 investigations) with potential exposure to the maximum reported concentrations the metals is expressed as a hazard index (HI) of 12.6, which is greater than the background HI of 2.5. The reasonable maximum EPC for arsenic (231 mg/kg) accounts for nearly 85 percent of the noncancer HI.

5. Conclusions and Recommendations

The primary objective of investigations conducted at PRL 606 was to assess whether a release of hazardous substances or pollutants into the environment has occurred due to aircraft maintenance activities conducted by the Marine Corps. A review of available records, visual site inspections, and soil sampling were conducted for this assessment. One soil sample collected in 2003 contained arsenic in excess of the former MCAS El Toro background. Subsequent sampling was conducted in 2005 to confirm this result and delineate the potential soil distribution. The reported arsenic concentration in the subsequent sample at location HA3 was 3.6 mg/kg, was less than the former MCAS El Toro background value of 6.86 mg/kg. However, the California DTSC recommended additional investigation to characterize the distribution of arsenic at location HA2 in a letter dated 3 February 2006.

Subsequent samples were collected in 2008 to characterize the distribution of arsenic. Arsenic was reported at concentrations of 231 mg/kg, 217 mg/kg, and 127 mg/kg in the shallow soil samples (1.5 feet bgs) collected at locations HA4, HA5, and HA6 (all inside the building), respectively. All these samples exceeded the former MCAS El Toro background value of 6.86 mg/kg. None of the reported concentrations of arsenic in the deeper soil samples (4 feet bgs) exceeded the former MCAS El Toro background value.

The initial objective for evaluating this facility was to assess the potential for the release of primarily hydrocarbons and to a lesser extent metals as a result of aircraft maintenance. Data collected during these investigations did not document a release of hydrocarbons or other expected constituents. In addition, there was no visual evidence of staining or etching that would be indicative of a release.

The arsenic concentrations exceeding the former MCAS El Toro background are not attributable to Marine Corps aircraft maintenance activities and appears to reflect conditions prior to the start of

operations at the hangar. The presence of elevated arsenic concentrations in only the top of the foundation suggests some form of surface application. Use of registered organic arsenic based herbicides would have been legal and would not constitute a CERCLA release.

Based on the above finding, no further investigation is recommended for the potential releases associated with the aircraft maintenance activities. However, upon transfer the new land owner will be notified about the presence of these localized elevated arsenic concentrations. The notification will also state that these herbicides containing arsenic appear to have been legally applied and do not represent a CERCLA release.

6. References

Bechtel National, Inc. (BNI). 1996. *Final Technical Memorandum, Background and Reference Levels, Remedial Investigations, Marine Corps Air Station El Toro, California.* San Diego, CA: NAVFAC EFD SOUTHWEST.

Earth Tech, Inc. (Earth Tech). 2005. *Summary Report for Group III Potential Release Locations, Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. October.

_____. 2008. *Final Site Inspection Work Plan, Potential Release Locations, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. May.

Environmental Protection Agency (EPA), United States. 2002. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites.* Office of Emergency and Remedial Response. OSWER 9285.6-10. Washington, D.C. December.

———. 2004a. *EPA Region 9 PRGs* [Preliminary Remediation Goals] *Tables.* San Francisco, CA. October.

———. 2004b.*SW-846 On-Line, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm. Office of Solid Waste.

———. 2006. *Guidance for the Data Quality Objectives Process. EPA QA/G-4.* EPA/240/B-06/001. Office of Environmental Information. August.

Naval Facilities Engineering Command Southwest (NAVFAC SW). 1993. *Marine Corps Air Station El Toro, California, Installation Restoration Program, Final Resource Conservation Recovery Act (RCRA), Facility Assessment Report, Volume I.* San Diego, CA. July.

———. 2003a. *Draft Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* San Diego, CA. February.

———. 2003b. *Final Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* San Diego, CA. September.

Tables

Table 1: Former Locations of Concern – PRL 606

LOC Name	Description	Action	Status	Concurrence
PCB T82	Pad mounted transformer that contained PCBs	Replaced with a non-PCB transformer. Assigned an Environmental Condition of Property category of 1* (NAVFAC SW 2003b)	NFA	DTSC, 25 September 2003 EPA, 25 September 2003
RFA 152 (SWMU/AOC 152)	Aircraft wash area	Investigated, RCRA Facility Assessment (NAVFAC SW 1993)	NFA	BRAC Cleanup Team, 23 July 1996
TAA 606 (SWMU/AOC 255)	Less than 90 day TAA	No longer active	NFA	DTSC, 16 September 2004
UST 606A	500-gallon diesel UST	Removed	NFA	RWQCB, 1 November 1997

Notes:
*Areas where no release or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)
AOC = area of concern
BRAC = Base Realignment and Closure
DTSC = Department of Toxic Substances Control
EBS = Environmental Baseline Survey
EPA = Environmental Protection Agency
LOC = location of concern
NAVFAC SW = Naval Facilities Engineering Command Southwest
NFA = no further action
PCB = polychlorinated biphenyl
PRL = potential release location
RCRA = Resource Conservation and Recovery Act
RFA = RCRA Facility Assessment
RWQCB = Regional Water Quality Control Board, Santa Ana Region
SWMU = Solid Waste Management Unit
TAA = temporary accumulation area
UST = underground storage tank

Table 2: Soil Sampling and Analyses Summary – PRL 606

Sample Location	EPA ID	Sample Depth (feet bgs)	Sampling Technique	Analyte Group and Analytical Method[a]
				Arsenic 6010B
HA2	LW073	4	Direct Push	X
HA3	LW074	4	Direct Push	X
HA4	LW075	1.5	Direct Push	X
HA4	LW076	4	Direct Push	X
HA5	LW077	1.5	Direct Push	X
HA5	LW078	4	Direct Push	X
HA6	LW079	1.5	Direct Push	X
HA6	LW080	4	Direct Push	X

Notes:
[a] Analysis was in general accordance with the listed methods provided in EPA Publication SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.

bgs below ground surface
EPA Environmental Protection Agency
ID identification
PRL potential release location
SI Site Inspection
X analysis was performed for the specified analyte

Table 3: Analytical Results Summary – PRL 606

Sample Location	EPA ID	Sample Depth (feet bgs)	Lithology Description	Arsenic Concentration (mg/kg) (6.86 mg/kg)[a] (0.062 mg/kg)[b]
HA2	LW073	4	Poorly graded sand, coarse grain, trace gravel (semi-rounded), dark brown	3.2
HA3	LW074	4	Silty sand, fine- to coarse grained, dark brown	2.2
HA4	LW075	1.5	Silty sand, trace gravel, fine-to coarse grained, light green	**231**
HA4	LW076	4	Poorly graded sand, fine-to coarse grained, dark brown	2
HA5	LW077	1.5	Poorly graded sand with gravel, yellowish	**217**
HA5	LW078	4	Poorly graded sand, medium grain, trace gravel, dark brown	1.7
HA6	LW079	1.5	Poorly graded sand, fine to medium, trace gravel, dark brown	**127 J**
HA6	LW080	4	Poorly graded sand, fine to medium, trace gravel, moist	2.1

Notes:
[a] Screening Level as per the *Final SI Work Plan* (Earth Tech 2008), which is the former MCAS El Toro background value.
[b] California-modified PRG (EPA 2004a).

bgs	below ground surface
BNI	Bechtel National, Inc.
EPA	Environmental Protection Agency
ID	identification
J	indicates an estimated value
MCAS	Marine Corps Air Station
mg/kg	milligrams per kilogram
PRG	preliminary remediation goal
PRL	potential release location
SI	Site Inspection

Table 4: Pre-Construction Borehole Lithology

Borehole Location	Sample Depth (feet below ground surface)	Description of Lithology
7	0 to 8	Sand – well graded, brown, occasional gravel from 4 feet to 8 feet
	8 to 12	Silty sand – fine, small amount of silt, brown
	12 to 17	Lean clay – sandy, medium plasticity, brown
	17 to 28	Silty sand – fine to medium small amount of silt, brown
	28 to 32	Silt – considerable amount of sand, inorganic, light brown
	32 to 40	Sand – fine to medium, poorly graded, clean, light brown
8	0 to 1	Gravely sand – well graded gravel to 1", yellowish brown (fill)
	1 to 10	Silty sand – fine to medium, small amount of silt, brown
	10 to 17.5	Sand – fine to medium, poorly graded, clean, light brown
	17.5 to 19	Silty sand – fine to medium, small amount of silt, brown
	19 to 25	Sand – medium, poorly graded, clean, brown
	25 to 35	Silt – small amount of sand, non-plastic, brown
	35 to 37.5	Sand – fine poorly graded, clean, tan
	37.5 to 45	Silt – small amount of sand, non-plastic, brown
	45 to 47	Gravely sand – poorly graded, dirty brown
	47 to 50	Silty sand – fine considerable amount of silt, brown
9	0 to 16	Silty sand – fine to medium, small amount of silt, light brown
	16 to 19	Lean clay – sandy, stiff, medium plasticity, brown
	19 to 22	Silty sand – fine, large amount of silt, brown
	22 to 30	Sand – fine to medium, poorly graded, clean, tan
	30 to 40	Lean clay – sandy, stiff, medium plasticity, brown

Source: Record Drawings Sheet C-3, Marine Corps Air Station, El Toro Aircraft Maintenance Hangars (Buildings 605/606), Site Development Plan Part II, 10 September 1965.

Table 5: Risk Screening Results - PRL 606

Constituent	MCAS El Toro Background Concentrations (95th Quantile)[a]	Reasonable Maximum EPC*	Carcinogenic PRG[b]	Noncarcinogenic PRG[b]	Risk Corresponding to Reasonable Maximum EPC				Risk Corresponding to Background			
					Carcinogenic		Noncarcinogenic		Carcinogenic		Noncarcinogenic	
					Excess Cancer Risk[c]	Percent Contribution to Cancer Risk[d]	HI[e]	Percent Contribution to Noncancer Hazard[d]	Excess Cancer Risk[f]	Percent Contribution to Cancer Risk[g]	HI[h]	Percent Contribution to Noncancer Hazard[g]
Metals (mg/kg)												
Aluminum	14,800	17,100	--	7.6E+04	--	--	2.2E-01	1.8%	--	--	1.9E-01	7.8%
Arsenic[i]	6.86	**231**	6.2E-02	2.2E+01	3.8E-03	100.0%	1.1E+01	84.6%	1.1E-04	99.9%	3.2E-01	12.7%
Barium	173	149	--	5.4E+03	--	--	2.8E-02	0.2%	--	--	3.2E-02	1.3%
Cadmium	2.35	0.6	1.4E+03	3.7E+01	4.3E-10	0.0%	1.6E-02	0.1%	1.7E-09	0.0%	6.3E-02	2.5%
Calcium	46,000	9,090	--	--	--	--	--	--	--	--	--	--
Chromium	26.9	23.2	2.1E+02	--	1.1E-07	0.0%	--	--	1.3E-07	0.1%	--	--
Cobalt	6.98	9	9.0E+02	1.4E+03	1.0E-08	0.0%	6.5E-03	0.1%	7.7E-09	0.0%	5.1E-03	0.2%
Copper	6.41	8.5	--	3.1E+03	--	--	2.7E-03	0.0%	--	--	2.0E-03	0.1%
Iron	18,400	21,500	--	2.3E+04	--	--	9.2E-01	7.3%	--	--	7.8E-01	31.3%
Lead[j]	15.1	5.5	--	1.5E+02	--	--	--	--	--	--	--	--
Magnesium	8,370	8,960	--	--	--	--	--	--	--	--	--	--
Manganese	291	289	--	1.8E+03	--	--	1.6E-01	1.3%	--	--	1.7E-01	6.6%
Mercury	0.22	0.020	--	2.3E+01	--	--	8.5E-04	0.0%	--	--	9.4E-03	0.4%
Nickel	15.3	12.7	--	1.6E+03	--	--	8.1E-03	0.1%	--	--	9.8E-03	0.4%
Potassium	4,890	4,830	--	--	--	--	--	--	--	--	--	--
Vanadium	71.8	44.7	--	7.8E+01	--	--	5.7E-01	4.5%	--	--	9.2E-01	36.7%
Zinc	77.9	66.3	--	2.3E+04	--	--	2.8E-03	0.0%	--	--	3.3E-03	0.1%
			Cumulative Maximum Risk		**4.E-03**		**12.6**		**1.E-04**		**2.5**	

Notes:

Concentrations in bold font indicates values greater than the screening level.

*The maximum reported concentrations of analytes have been used as resonable maximum EPC, except for arsenic for which the 95% UCL concentration has been estimated using the ProUCL Version 4.

[a] Source: BNI 1996

[b] United States EPA Region 9 PRGs (2004a)

[c] Excess cancer risk = 1E-06 x (EPC/Carcinogenic PRG)

[d] With respect to cumulative excess cancer risk or hazard index

[e] HI = EPC / Noncarcinogenic PRG

[f] Excess cancer risk = 1E-06 x (MCAS El Toro Background Concentration/Carcinogenic PRG)

[g] With respect to cumulative excess cancer risk or hazard index

[h] HI = MCAS El Toro Background Concentration / Noncarcinogenic PRG

[i] Cal-modified Carcingenic PRGs (2004a) were used for arsenic for excess cancer risk calculations because they are significantly more protective than the corresponding EPA Region 9 PRGs

An hazard quotient for lead could not be determined because the PRGs for lead were developed using the blood-lead levels and a reference dose is not available

-- = value does not exist

BNI = Bechtel National, Inc.

EPA = Environmental Protection Agency

EPC = exposure point concentration

HI = hazard index

MCAS = Marine Corps Air Station

mg/kg = milligrams per kilogram

PRG = preliminary remediation goal

PRL = potential release location

Figures

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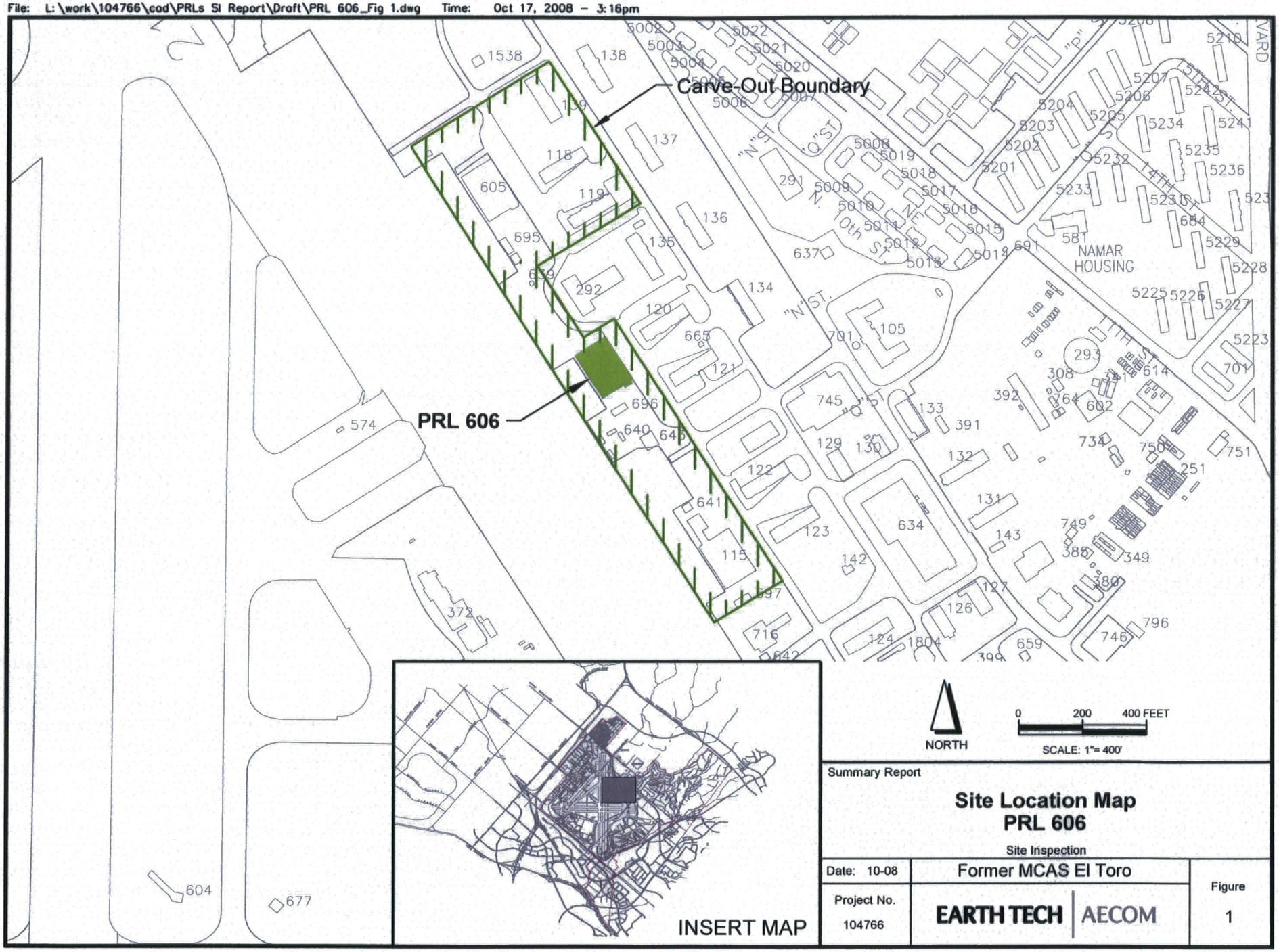

Summary Report

Site Location Map
PRL 606

Site Inspection

Date: 10-08	Former MCAS El Toro	Figure 1
Project No. 104766	EARTH TECH | AECOM	

Building Exterior
(Facing Southeast)

Soil Sample Borehole HA2
in Hanger
(Facing Southwest)

LEGEND:

- Edge of Road
- Existing Infrastructure
- Carve-out Boundary
- HA2 ⊕ 2003 Sample Location (NAVFAC SW 2003) (Sample Depth: 0.5 to 2 ft bgs; Analytes: TPH, VOCs, SVOCs, and Metals)
- HA3 ◕ Soil Sample Location (Earth Tech 2005) (Sample Depth: 1.5 ft bgs; Analytes: Arsenic)
- HA4 ◕ Soil Sample Location (Earth Tech 2008) (Sample Depth: 1.5 ft and 4 ft bgs; Analytes: Arsenic). In addidtion, Soil Samples were Collected at 4 ft bgs at Locations HA2 and HA3 and Analyzed for Arsenic
- ◉ Preconstruction Borehole Location

NORTH

0 15' 30 FEET

SCALE: 1" = 30'

Note: Features and interior layout are approximate and may not be to scale

Summary Report

Site Plan
PRL 606

Site Inspection

Date: 10-08	Former MCAS El Toro	Figure 2
Project No. 104766	EARTH TECH | AECOM	

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Appendix A
2005 Soil Sampling Results

Table A-1: Analytical Results Summary - PRL 606

Analyte	MCAS El Toro Background Concentrations (95th Quantile)[a]	Residential Soil PRG[b]	Sample Location	PRL606-HA1	PRL606-HA2	PRL606-HA3
			Sample Depth	0.5-1.5 feet bgs	1-2 feet bgs	1.5 feet bgs
			EPA ID	LJ115	LJ116	LJ558
Total Petroleum Hydrocarbons (TPH) (mg/kg)						
TPH as Diesel	--	--		18	3 J	NA
TPH as Motor Oil	--	--		7 J	6 J	NA
Metals (mg/kg)						
Aluminum	14,800	7.6E+04		*17,100*	9,500	NA
Arsenic[c]	6.86	6.2E-02		**6.9**	**11.1**	3.6
Barium	173	5.4E+03		143	149	NA
Cadmium	2.35	3.7E+01		0.6	0.5	NA
Calcium	46,000	--		9,090	6,700	NA
Chromium	26.9	2.1E+02		15.1	23.2	NA
Cobalt	6.98	9.0E+02		*9.0*	*7.8*	NA
Copper	10.50	3.1E+03		8.5	7.1	NA
Iron	18,400	2.3E+04		*21,500 J*	13,500 J	NA
Lead[c]	15.1	1.5E+02		5.5	3.4	NA
Magnesium	8,370	--		*8,960 J*	5,270 J	NA
Manganese	291	1.8E+03		289 J	224 J	NA
Mercury	0.22	2.3E+01		0.017	0.02	NA
Nickel	15.3	1.6E+03		9	12.7	NA
Potassium	4,890	--		4,830 J	3,000 J	NA
Vanadium	71.8	7.8E+01		44.7	30.5	NA
Zinc	77.9	2.3E+04		66.3	42.2	NA

Notes

Concentrations in **bold** indicate values greater than the residential soil PRGs and the MCAS El Toro background values

Concentrations with *italic underline* indicate values greater than the MCAS El Toro background, but less than the residential soil PRGs or for which there are no residential soil PRGs

[a] Source: BNI 1996a

[b] Analytical results were compared to EPA Region 9 PRGs (EPA 2004a)

[c] Analytical results for arsenic and lead were compared to California-modified PRGs (2004a) because they are signifcantly more protective than the corresponding EPA Region 9 PRGs

Location HA3 was sampled during this investigation (2005), and all other locations were sampled during the 2003 investigation

-- = value does not exist

bgs = below ground surface

BNI = Bechtel National, Inc.

EPA = Environmental Protection Agency

ID = identification

J = indicates an estimated value

MCAS = Marine Corps Air Station

mg/kg = milligrams per kilogram

NA = not analyzed

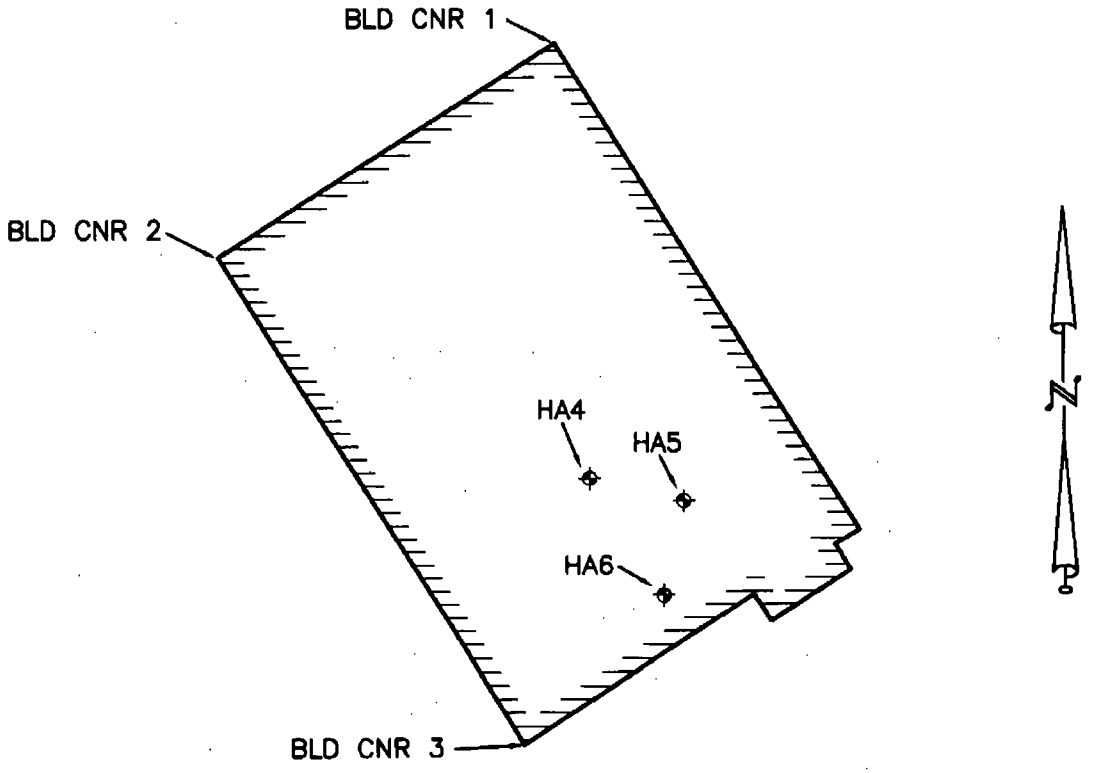
PRG = preliminary remediation goal

PRL = potential release location

TPH = total petroleum hydrocarbons

Appendix B
Land Surveying

PRL606-BLD.606



PRL AND NOTABLE FEATURES LOCATIONS			
STATION	**NORTHINGS**	**EASTINGS**	**ELEV.**
BLD CNR 1	2193774.60	6113768.58	389.41
BLD CNR 2	2193713.75	6113672.52	389.18
BLD CNR 3	2193576.49	6113759.69	389.17
HA4	2193650.88	6113777.97	389.50
HA5	2193644.50	6113804.78	389.62
HA6	2193617.64	6113798.94	389.46

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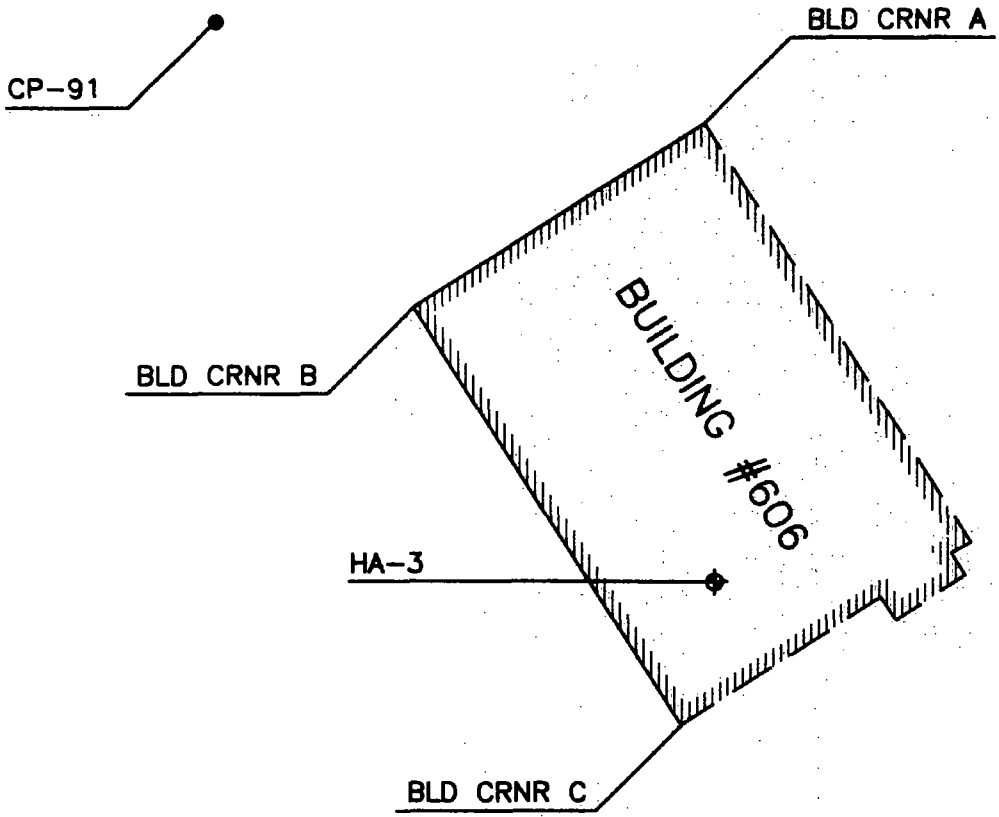
POTENTIAL RELEASE LOCATION SKETCH

SCALE: 1"= 50'	DATE: 05/30/2008
BY: ANK	JOB NO.: 04-1058-2227.000-1019



BUILDING #606 PRL AND NOTABLE FEATURES LOCATIONS			
STATION	NORTHING	EASTING	ELEVATION
BLD CRNR A	2193774.60	6113768.58	
BLD CRNR B	2193713.75	6113672.52	
BLD CRNR C	2193576.49	6113759.69	
CP 91	2193807.69	6113608.17	390.03
BLD 606-HA 3	2193623.63	6113770.86	389.35

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POTENTIAL RELEASE LOCATION SKETCH
BUILDING #606

SCALE:	1"=60'	DATE:	06-06-05
BY:	JCL	JOB NO.:	04-1058-2227.000-535

Attachment 6
Summary Report
PRL Runway Infield Area

Summary Report for PRL Runway Infield Area, Site Inspection

FORMER MARINE CORPS AIR STATION EL TORO, CALIFORNIA

October 2008

Prepared for:
Base Realignment and Closure
Program Management Office West
San Diego, California

Prepared by:
Earth Tech, Inc.
841 Bishop Street, Suite 500
Honolulu, HI 96813-3920

Prepared under:
Naval Facilities Engineering Command
Contract Number N62742-03-D-1837
Contract Task Order 0032
DCN: ET-1837-0032-0001

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FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

µg/kg	micrograms per kilogram
B(a)P	benzo(a)pyrene
BCT	BRAC Cleanup Team
BNI	Bechtel National, Inc.
BRAC	Base Realignment and Closure
DON	Department of the Navy
DTSC	Department of Toxic Substances Control
EBS	Environmental Baseline Survey
ECP	Environmental Condition of Property
EPA	Environmental Protection Agency
EPC	exposure point concentration
ID	identification
J	indicates an estimated value
JEG	Jacobs Engineering Group
LOC	location of concern
MCAS	Marine Corps Air Station
NAVFAC SW	Naval Facilities Engineering Command Southwest
OEHHA	Office of Environmental Health Hazard Assessment
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PEF	potency equivalency factor
PERF	Project Environmental Review Form
PRG	preliminary remediation goal
PRL	potential release location
RIA	Runway Infield Area
SI	Site Inspection
TPH	total petroleum hydrocarbons
U	indicates the compound or analyte was analyzed for but was not detected at or above the stated limit
UCL	upper confidence limit
X	analysis was performed for the specified analyte

1. Background

The runways at the former Marine Corps Air Station (MCAS) El Toro were originally constructed between 1942 and 1943 and have undergone several modifications and extensions over the life of the station (Figure 1). Waste petroleum, waste oil and other liquid wastes (potentially containing polychlorinated biphenyls [PCBs]) were applied to unpaved areas along the edges of the runways for dust suppression and control of vegetation. Past releases of fuel and lubricants onto the runways and taxiways may have migrated to bordering unpaved areas and drainage systems through washing and storm water runoff. Byproducts of combustion from jet engines may also have accumulated in the surrounding soil and structures especially in areas used for engine testing and run-up (Jet Blast Deflector Areas). Based on this information, the 1995 environmental baseline survey (EBS) (Jacobs Engineering Group [JEG] 1995) identified the Airfield Operations Area (comprising runways, taxiways and adjacent areas) as a location of concern (LOC). Sampling of this LOC was conducted as part of the station-wide polynuclear aromatic hydrocarbon (PAH) study to establish background levels of PAHs in MCAS El Toro surface soils (Bechtel National, Inc. [BNI] 1996). This study concluded that, due to the urban setting, station-wide PAH reference-level concentrations did not exceed Environmental Protection Agency (EPA) Region 9 residential soil preliminary remediation goals (PRGs) (EPA 2004a). Additionally, the study concluded that the reported results of the dioxin and metals analyses were supportive of unrestricted release of the runway parcels and the Federal Facility Agreement signatories concurred with this finding. Subsequently, the portions of the airfield operations area that were considered to be LOCs were changed from Environmental Condition of Property (ECP) Type 7 to ECP Type 3 (Naval Facilities Engineering Command Southwest [NAVFAC SW] 1998). ECP Category 7 was assigned to areas that have not been evaluated or that require additional evaluation. ECP Category 3 was assigned to areas where release, disposal, and/or migration of hazardous substances have occurred, but at concentrations that do not require a removal or remedial action. Subsequent to this, the Base Realignment and Closure Clean-up Team (BCT) requested further evaluation of the runways area for PCBs and PAHs. The runways were identified as Potential Release Location (PRL) Runways for the 2002 EBS (Earth Tech 2003). PRL Runway Infield Area (RIA) is associated with the Station's Runways, which is located in the northwest quadrant of former MCAS El Toro, California (see Figure 1).

Soil Sampling 2003. Based on the review of available documentation, including similar activities at other Department of Defense installations, and in concurrence with the regulatory agencies, sampling along the edges of concrete runways was conducted during 2003. Similarly, impacts under the existing concrete runways where runway extensions had been constructed over potentially impacted soil were also evaluated. Soil samples were collected from a total of 13 areas and analyzed for PCBs, PAHs, and total petroleum hydrocarbons (TPH). At each area, two soil samples were collected from boreholes drilled approximately 25 feet apart (designated A and B, respectively: e.g., HA7A and HA7B), and composited for laboratory analysis (see Appendix A). The only analyte exceeding its residential PRG was benzo(a)pyrene (160 micrograms per kilogram [µg/kg]) reported in the soil sample from borehole HA7 (see Figure 2). Aroclor 1260 was the only PCB reported in soil samples at a maximum concentration of 9 µg/kg, which is less than its residential PRG of 220 µg/kg. Based on the 2003 sampling results, the BCT concurred with the finding of no further action for the remainder of the runway area (NAVFAC SW 2003), except for the area in the vicinity of sampling location HA7.

In a letter dated 11 April 2003, EPA requested further evaluation in the vicinity of location HA7. In a letter dated 11 April 2003, the California Department of Toxic Substances Control (DTSC) recommended that discrete samples be collected from locations HA7A and HA7B and analyzed for PAHs. To further investigate the area in the vicinity of sampling location HA7, this area was designated as PRL RIA.

Soil Sampling 2004. In March 2004, soil samples were collected from five locations in the vicinity of HA7 in accordance with the sampling plan presented to the BCT. All five samples were collected at a depth of 6 inches bgs and analyzed for PAHs. Three samples, collected from locations HA16, HA17, and HA18, were analyzed for TPH.

Results of the March 2004 sampling event indicated a potential for a wider PAH distribution in the PRL RIA. Therefore, based on the analyses of trends in PAH concentrations and the site conceptual model, which indicates greater probability of the presence of PAHs closer to the edge of the runway, six additional soil samples were collected in October 2004. The samples were collected from locations HA19 through HA24 at a depth of 6 inches bgs and analyzed for PAHs and TPH (as diesel oil and motor oil).

The analytes that exceeded residential PRGs were benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and dibenz(a,h)anthracene. All profiles show a rapid drop in concentrations of PAHs at a distance of approximately 20 to 30 feet from the edge of the runway. The profiles also showed that soil with PAH concentrations greater than residential PRGs could be conservatively approximated to extend 50 feet from the edge of the runway. No discernable trend was observed in PAH concentrations along the length of the runway as evident from the analytical results of samples.

The analytical results for these soil samples are presented in Appendix A and the Summary Report for Group I PRLs (Earth Tech 2005). These soil sample locations are shown on Figure 2. The Summary Report for Group I PRLs recommended further investigation to delineate the PAH distribution exceeding residential PRGs along the length of the runway.

2. Site Inspection Soil Sampling Objectives

Surface soil extending 50 feet from the edge of the runway was removed during runway demolition and grading operations performed by the developer, pursuant to the Project Environmental Review Form (PERF) completed for this project (November 1, 2006). The Lessee must complete a PERF for any work proposed in the leased portion of the property. The PERF was submitted to the Department of the Navy (DON) for approval prior to start of the work. The DON determined that the proposed work would not affect the investigations, approved the PERF (November 1, 2006), and forwarded it to EPA and DTSC for their concurrence. The regulatory agencies reviewed and concurred with this PERF (November 2006).

Therefore, soil sampling using systematic and grid sampling was conducted at PRL RIA to characterize the current distribution of PAHs after grading operations that were performed pursuant to the PERF. A summary of Site Inspection (SI) soil sampling activities is presented in Section 3, and the results are presented in Section 4.

3. Sampling and Analysis Summary

Sampling was conducted for PRL RIA in May 2008 in accordance with the *Final Site Inspection Work Plan, Potential Release Locations* (Work Plan) (Earth Tech 2008). The sample locations are shown on Figure 2 and a summary of sampling and analyses performed is provided in Table 2.

A total of 28 soil samples were collected at the bottom of the excavation at PRL RIA to verify the absence or presence of soil with PAHs exceeding the EPA Region 9 residential PRG/California-modified PRG concentration using disposable trowels.

4. Investigation Results

This section presents analytical results and discusses the results of data evaluation and risk screening. The analytical results for the samples collected at PRL RIA along with the United States EPA Region 9 or California-modified residential PRGs (EPA 2004a) are presented in Table 2. Appendix B presents the land surveying data.

4.1 Analytical Results and Quality Assurance

Some results are flagged as estimated due to laboratory quality control results exceeding planned limits. The exceedance was not substantial and the analytical batch was validated based on other quality control. The data is usable and no changes to the conclusions or recommendations are warranted.

4.2 Results Evaluation and Risk Screening

4.2.1 Results Evaluation

None of the reported concentrations of PAHs exceeded EPA Region 9 residential soil PRGs. Benzo(k)fluoranthene was reported at a maximum concentration of 450 µg/kg (flagged as estimated) at the bottom of the excavation at location DSS12, which exceeded the California-modified residential soil PRG of 380 µg/kg, but is less than the EPA Region 9 residential soil PRG of 6,215 µg/kg.

With the exception of this location, PAHs at all other locations were below their respective EPA Region 9 or California-modified residential soil PRGs. The soil sample was collected at the edge of the excavation and may have contained remnants of the waste petroleum, waste oil and other liquid wastes (potentially containing PCBs) which were applied to unpaved areas along the edges of the runways for dust suppression and control of vegetation. Therefore, the PAH results from location DSS12 are assessed to be an isolated exceedance. The other samples collected at this PRL were less than the EPA Region 9 or California-modified residential soil PRGs suggesting this concentration is localized at location DSS12 and is not indicative of a release.

4.2.2 Risk Screening

As part of the risk estimation, the benzo(a)pyrene equivalent concentration was calculated for the samples collected at PRL RIA, using the potency equivalency factors provided in the updated Technical Support Document dated May 2005 (Office of Environmental Health Hazard Assessment [OEHHA] 2005). This benzo(a)pyrene equivalent concentration was then used to estimate the carcinogenic risk at each of these locations due to PAHs. These calculations are presented in Table 3.

The first step in risk screening of constituents analyzed was to estimate a reasonable maximum exposure point concentration (EPC) for benzo(a)pyrene equivalent at PRL RIA, which corresponds to the highest exposure that is reasonably expected to occur at the site. The value of reasonable maximum EPC was estimated by calculating the 95 percent upper confidence limit (UCL) of the mean concentration, and comparing it with its maximum reported concentration; the lesser of the two values (95 percent UCL and maximum reported concentration) was then used as the reasonable maximum EPC. The 95 percent UCL of the mean concentration of benzo(a)pyrene equivalent at PRL RIA was estimated using the ProUCL program that is based on the EPA (2002) guidance document. Benzo(a)pyrene equivalent concentrations do not follow lognormal distribution; therefore, the 95 percent Chebyshev UCL Method described in the EPA guidance document was used for the 95-percent-UCL calculation. The 95 percent UCL of the mean concentration of benzo(a)pyrene equivalent using this method was estimated to be 66.6 µg/kg, which is less than the maximum

calculated benzo(a)pyrene equivalent concentration of 232.1 µg/kg. Therefore, the value of reasonable maximum EPC for benzo(a)pyrene equivalent was estimated to be 66.6 µg/kg.

The cumulative carcinogenic risk corresponding to a benzo(a)pyrene equivalent EPC value of 66.6 µg/kg is $1x10^{-6}$. Specifically, the EPC for benzo(k)fluoranthene was 195.5 µg/kg which is less than the California-modified and EPA Region 9 residential soil PRG value of 380 µg/kg and 6,215 µg/kg, respectively. The computed carcinogenic risk is approximately equal to the lower bound of the EPA-established risk management range of 10^{-6} to 10^{-4}.

5. Conclusions and Recommendations

The primary objective of investigations conducted at PRL RIA was to characterize the current distribution of PAHs after grading operations that were performed pursuant to the PERF. A review of available records, visual site inspections, and sampling activities were conducted for this assessment. The reported concentrations of PAHs in all the soil samples were less than their respective residential PRGs and are not indicative of a release. Benzo(k)fluoranthene was reported at a maximum concentration of 450 µg/kg in the soil sample from location DSS12, which is greater than its corresponding California-modified residential soil PRG but is less than the EPA Region 9 residential soil PRG.

The cumulative cancer risk for PRL RIA corresponding to a benzo(a)pyrene equivalent EPC value of 66.6 µg/kg is within the lower bound of the EPA established risk management decision range of 10^{-6} to 10^{-4}. Based on these observations and results, no further investigation is recommended for PRL RIA.

6. References

Earth Tech, Inc. (Earth Tech). 2005. *Summary Report for Group I Potential Release Locations, Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. February.

_____. 2008. *Final Site Inspection Work Plan, Potential Release Locations, Former Marine Corps Air Station, El Toro, California.* Long Beach, CA: NAVFAC SW. May.

Environmental Protection Agency (EPA), United States. 2002. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites.* Office of Emergency and Remedial Response. OSWER 9285.6-10. Washington, D.C. December.

———. 2004a. *EPA Region 9 PRGs* [Preliminary Remediation Goals] *Tables.* San Francisco, CA. October.

———. 2004b.*SW-846 On-Line, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm. Office of Solid Waste.

———. 2006. *Guidance for the Data Quality Objectives Process. EPA QA/G-4.* EPA/240/B-06/001. Office of Environmental Information. August.

Jacobs Engineering Group (JEG). 1995. *Marine Corps Air Station El Toro, El Toro California, Installation Restoration Program, Final Environmental Baseline Survey Report and Chain-of-Title Search,* April.

Naval Facilities Engineering Command Southwest (NAVFAC SW). 1998. Base Realignment and Closure Business Plan.

———. 2003. *Final Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California*. San Diego, CA. September.

Office of Environmental Health Hazard Assessment. 2005. *Technical Support Document for Describing Available Cancer Potency Factors.*
http://www.oehha.org/air/hot_spots/pdf/May2005Hotspots.pdf. May.

Tables

Table 1: Soil Sampling and Analyses Summary – PRL RIA

Sample Location	EPA ID	Sample Depth	Sampling Technique	Analyte Group and Analytical Method[a]
				PAHs 8270SIM
DSS1	LW082	Bottom	Disposable Hand Trowel	X
DSS2	LW083	Bottom	Disposable Hand Trowel	X
DSS3	LW084	Bottom	Disposable Hand Trowel	X
DSS4	LW085	Bottom	Disposable Hand Trowel	X
DSS5	LW086	Bottom	Disposable Hand Trowel	X
DSS6	LW087	Bottom	Disposable Hand Trowel	X
DSS7	LW088	Bottom	Disposable Hand Trowel	X
DSS8	LW089	Bottom	Disposable Hand Trowel	X
DSS9	LW090	Bottom	Disposable Hand Trowel	X
DSS10	LW091	Bottom	Disposable Hand Trowel	X
DSS11	LW092	Bottom	Disposable Hand Trowel	X
DSS12	LW093	Bottom	Disposable Hand Trowel	X
DSS13	LW094	Bottom	Disposable Hand Trowel	X
DSS14	LW095	Bottom	Disposable Hand Trowel	X
DSS15	LW096	Bottom	Disposable Hand Trowel	X
DSS16	LW097	Bottom	Disposable Hand Trowel	X
DSS17	LW098	Bottom	Disposable Hand Trowel	X
DSS18	LW099	Bottom	Disposable Hand Trowel	X
DSS19	LW100	Bottom	Disposable Hand Trowel	X
DSS20	LW101	Bottom	Disposable Hand Trowel	X
DSS21	LW102	Bottom	Disposable Hand Trowel	X
DSS22	LW103	Bottom	Disposable Hand Trowel	X
DSS23	LW104	Bottom	Disposable Hand Trowel	X
DSS24	LW105	Bottom	Disposable Hand Trowel	X
DSS25	LW106	Bottom	Disposable Hand Trowel	X
DSS26	LW107	Bottom	Disposable Hand Trowel	X
DSS27	LW108	Bottom	Disposable Hand Trowel	X
DSS28	LW109	Bottom	Disposable Hand Trowel	X

Notes:
[a] Analysis was in general accordance with the listed methods provided in EPA Publication SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.
EPA Environmental Protection Agency
ID identification
PRL potential release location
RIA Runway Infield Area
SI Site Inspection
X analysis was performed for the specified analyte

Table 2: Analytical Results Summary - PRL RIA

Analyte	Residential Soil PRG[a]	Sample Location	DSS1	DSS2	DSS3	DSS4	DSS5	DSS6	DSS7	DSS8	DSS9	DSS10	DSS11	DSS12	DSS13	DSS14	DSS15	DSS16	DSS17	DSS18	DSS19	DSS20	DSS21	DSS22	DSS23	DSS24	DSS25	DSS26	DSS27	DSS28
		Sample Depth	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom
		EPA ID	LW082	LW083	LW084	LW085	LW086	LW087	LW088	LW089	LW090	LW091	LW092	LW093	LW094	LW095	LW096	LW097	LW098	LW099	LW100	LW101	LW102	LW103	LW104	LW105	LW106	LW107	LW108	LW109
Polynuclear Aromatic Hydrocarbons (µg/kg)																														
Acenaphthene	3.7E+06	[redacted]	5.1 U	5 U	5.1 U	5.1 U	5.1 U	1.1 J	5.1 U	5.1 U	5 U	5 U	5.3 U	2 J	5.2 U	5.1 U	1.8 J	5 U	5.1 U	5.1 U	5 U	17	5 U	5 U	5.1 U	1.3 J	5 U	5 U	1.5 J	1.5 J
Acenaphthylene	--	[redacted]	3 J	1.3 J	1.8 J	2.6 J	0.92 J	11	3.9 J	5.1 U	5 U	3.4 J	2.3 J	11	5.2 U	5.1 U	23	5 U	5.1 U	5.1 U	1 J	19	5 U	5 U	5.1 U	13	1.3 J	1.9 J	13	18
Anthracene	2.2E+07	[redacted]	1.1 J	5 U	5.1 U	0.93 J	5.1 U	5 J	2.7 J	1 J	5 U	3.3 J	6.7	17	5.2 U	5.1 U	12	5 U	5.1 U	5.1 U	5 U	15	5 U	5 U	5.1 U	6.6	5 U	5 U	7.7	9.2
Benz(a)anthracene	6.2E+02	[redacted]	5.1 U	5 U	3.6 J	3 J	5.1 U	15	19	4.6 J	5 U	41	110	230	5.2 U	5.1 U	37	5 U	0.94 J	5.1 U	5 U	85	5 U	5 U	5.1 U	18	1.8 J	2.9 J	27	33
Benzo(a)pyrene	6.2E+01	[redacted]	5.1 U	5 U	1.5 J	1.2 J	5.1 U	6.8	6.1	1.2 J	5 U	21	31	60	5.2 U	5.1 U	18	5 U	1.6 J	5.1 U	0.99 J	22	5 U	5 U	5.1 U	8.7	5 U	1.7 J	8.5	11
Benzo(b)fluoranthene	6.2E+02	[redacted]	1.8 J	5 U	6.1 J	6	1.4 J	35	27	6.2	1.8 J	100 J	160	440 J	5.2 U	5.1 U	110 J	5 U	1.1 J	5.1 U	2.5 J	140	5 U	5 U	5.1 U	46	4.6 J	6.9	54	73
Benzo(g,h,i)perylene	--	[redacted]	2.3 J	5 U	2.9 J	3.5 J	5.1 U	19	15	2.5 J	5 U	26	49	110	5.2 U	5.1 U	33	5 U	5.1 U	5.1 U	1.7 J	45	5 U	5 U	5.1 U	20	2.2 J	2.9 J	20	27
Benzo(k)fluoranthene[b]	3.6E+02	[redacted]	5.1 U	5 U	2 J	1.9 J	5.1 U	9.9	8.6	1.9 J	5 U	100 J	57	450 J	5.2 U	5.1 U	110 J	5 U	5.1 U	5.1 U	5 U	52	5 U	5 U	5.1 U	17	1.6 J	2 J	17	23
Chrysene[b]	3.6E+03	[redacted]	0.95 J	5 U	4.6 J	4 J	5.1 U	22	23	4.9 J	1.4 J	60	130	290	5.2 U	5.1 U	68	5 U	5.1 U	5.1 U	2 J	140	5 U	5 U	5.1 U	38	4 J	4.2 J	42	52
Dibenz(a,h)anthracene	6.2E+01	[redacted]	5.1 U	5 U	1.1 J	1 J	5.1 U	5.4	4.2 J	5.1 U	5 U	7.8	18	42	5.2 U	5.1 U	9.7	5 U	5.1 U	5.1 U	5 U	18	5 U	5 U	5.1 U	5.1	5 U	1.1 J	5.8	8.2
Fluoranthene	2.3E+06	[redacted]	5.1 U	5 U	4.8 J	4.2 J	5.1 U	23	23	6.1	1.4 J	53	150	280	5.2 U	5.1 U	85	5 U	5.1 U	5.1 U	2.7 J	230	5 U	5 U	5.1 U	56	6.1	2.9 J	60	63
Fluorene	2.7E+06	[redacted]	5.1 U	5 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5 U	5 U	5.3 U	1.9 J	5.2 U	5.1 U	1.9 J	5 U	5.1 U	5.1 U	5 U	19	5 U	5 U	5.1 U	1.6 J	5 U	5 U	1.8 J	1.5 J
Indeno(1,2,3-cd)pyrene	6.2E+02	[redacted]	2 J	5 U	3.1 J	3.4 J	1 J	19	13	2.4 J	5 U	23	50	110	5.2 U	5.1 U	29	5 U	5.1 U	5.1 U	1.2 J	46	5 U	5 U	5.1 U	17	1.7 J	2.8 J	19	26
2-Methylnaphthalene	--	[redacted]	5.1 U	5 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5 U	5 U	5.3 U	5 U	5.2 U	5.1 U	5 U	5 U	5.1 U	5.1 U	5 U	20	5 U	5 U	5.1 U	1.2 J	5 U	5 U	5 U	1.7 J
Naphthalene[b]	1.7E+03	[redacted]	5.1 U	5 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5 U	5 U	5.3 U	5 U	5.2 U	5.1 U	1.9 J	5 U	5.1 U	5.1 U	5 U	38	5 U	5 U	5.1 U	2.5 J	5 U	5 U	1.1 J	4 J
Phenanthrene	--	[redacted]	5.1 U	5 U	1.5 J	1.3 J	5.1 U	8.9	4.9 J	3.3 J	5 U	9.1	24	50	5.2 U	5.1 U	35	5 U	5.1 U	5.1 U	3.3 J	230	5 U	5 U	5.1 U	27	7.6	5 U	29	25
Pyrene	2.3E+06	[redacted]	1.8 J	5 U	5.7	4.6 J	5.1 U	26	28	6.7	1.5 J	61	150	300	5.2 U	5.1 U	89	5 U	5.1 U	5.1 U	2.6 J	220	5 U	5 U	5.1 U	58	7.5	3.7 J	63	67

Notes

Concentrations in **bold font** indicate values greater than the California-modified but less than the EPA Region 9 residential soil PRGs.

[a]Analytical results were compared to EPA Region 9 PRGs (2004a), with the exception of benzo(k)fluoranthene, chrysene, and naphthalene (see note b)

[b] Analytical results for benzo(k)fluoranthene, chrysene, and naphthalene were compared to California-modified PRGs (2004a) because they are significantly more protective than the corresponding EPA Region 9 PRGs

-- = value does not exist

µg/kg= micrograms per kilogram

EPA = Environmental Protection Agency

ID = identification

J = indicates an estimated value

PRG = preliminary remediation goal

PRL = potential release location

U= indicates the compound or analyte was analyzed for but was not detected at or above the stated limit

RIA= Runway Infield Area

Table 3: Benzo(a)Pyrene Equivalent Calculations - PRL RIA

Sample Location	Sample Depth	EPA ID	Benzo(a)pyrene (µg/kg)	Benzo(a)pyrene B(a)P Equivalent	Benz[a]anthracene (µg/kg)	Benz(a)anthracene B(a)P Equivalent	Benzo(b)fluoranthene (µg/kg)	Benzo(b)fluoranthene B(a)P Equivalent	Benzo(k)fluoranthene (µg/kg)	Benzo(k)fluoranthene B(a)P Equivalent	Chrysene (µg/kg)	Chrysene B(a)P Equivalent	Dibenz[a,h]anthracene (µg/kg)	Dibenz(a,h)anthracene B(a)P Equivalent	Indeno(1,2,3-cd)pyrene (µg/kg)	Indeno(1,2,3-cd)pyrene B(a)P Equivalent	Total B(a)P Equivalent	Risk
PEF				1		0.1		0.1		0.1		0.01		1.1		0.1		
DSS1	Bottom	LW082	*5.1*	5.1	*5.1*	0.51	1.8	0.18	*5.1*	0.51	0.95	0.0095	*5.1*	5.61	2	0.2	12.12	**2.0E-07**
DSS2	Bottom	LW083	*5*	5	*5*	0.5	*5*	0.5	*5*	0.5	*5*	0.05	*5*	5.5	*5*	0.5	12.55	**2.0E-07**
DSS3	Bottom	LW084	1.5	1.5	3.6	0.36	6.1	0.61	2	0.2	4.6	0.046	1.1	1.21	3.1	0.31	4.24	**6.8E-08**
DSS4	Bottom	LW085	1.2	1.2	3	0.3	6	0.6	1.9	0.19	4	0.04	1	1.1	3.4	0.34	3.77	**6.1E-08**
DSS5	Bottom	LW086	*5.1*	5.1	*5.1*	0.51	1.4	0.14	*5.1*	0.51	*5.1*	0.051	*5.1*	5.61	1	0.1	12.02	**1.9E-07**
DSS6	Bottom	LW087	6.8	6.8	15	1.5	35	3.5	9.9	0.99	22	0.22	5.4	5.94	19	1.9	20.85	**3.4E-07**
DSS7	Bottom	LW088	6.1	6.1	19	1.9	27	2.7	8.6	0.86	23	0.23	4.2	4.62	13	1.3	17.71	**2.8E-07**
DSS8	Bottom	LW089	1.2	1.2	4.6	0.46	6.2	0.62	1.9	0.19	4.9	0.049	*5.1*	5.61	2.4	0.24	8.37	**1.3E-07**
DSS9	Bottom	LW090	*5*	5	*5*	0.5	1.8	0.18	*5*	0.5	1.4	0.014	*5*	5.5	*5*	0.5	12.19	**2.0E-07**
DSS10	Bottom	LW091	21	21	41	4.1	100	10	100	10	60	0.6	7.8	8.58	23	2.3	56.58	**9.1E-07**
DSS11	Bottom	LW092	31	31	110	11	160	16	57	5.7	130	1.3	18	19.8	50	5	89.80	**1.4E-06**
DSS12	Bottom	LW093	60	60	230	23	440	44	450	45	290	2.9	42	46.2	110	11	232.10	**3.7E-06**
DSS13	Bottom	LW094	*5.2*	5.2	*5.2*	0.52	*5.2*	0.52	*5.2*	0.52	*5.2*	0.052	*5.2*	5.72	*5.2*	0.52	13.05	**2.1E-07**
DSS14	Bottom	LW095	*5.1*	5.1	*5.1*	0.51	*5.1*	0.51	*5.1*	0.51	*5.1*	0.051	*5.1*	5.61	*5.1*	0.51	12.80	**2.1E-07**
DSS15	Bottom	LW096	18	18	37	3.7	110	11	110	11	68	0.68	9.7	10.67	29	2.9	57.95	**9.3E-07**
DSS16	Bottom	LW097	*5*	5	*5*	0.5	*5*	0.5	*5*	0.5	*5*	0.05	*5*	5.5	*5*	0.5	12.55	**2.0E-07**
DSS17	Bottom	LW098	1.6	1.6	0.94	0.094	1.1	0.11	*5.1*	0.51	*5.1*	0.051	*5.1*	5.61	*5.1*	0.51	8.49	**1.4E-07**
DSS18	Bottom	LW099	*5.1*	5.1	*5.1*	0.51	*5.1*	0.51	*5.1*	0.51	*5.1*	0.051	*5.1*	5.61	*5.1*	0.51	12.80	**2.1E-07**
DSS19	Bottom	LW100	0.99	0.99	*5*	0.5	2.5	0.25	*5*	0.5	2	0.02	*5*	5.5	1.2	0.12	7.88	**1.3E-07**
DSS20	Bottom	LW101	22	22	85	8.5	140	14	52	5.2	140	1.4	16	17.6	46	4.6	73.30	**1.2E-06**
DSS21	Bottom	LW102	*5*	5	*5*	0.5	*5*	0.5	*5*	0.5	*5*	0.05	*5*	5.5	*5*	0.5	12.55	**2.0E-07**
DSS22	Bottom	LW103	*5*	5	*5*	0.5	*5*	0.5	*5*	0.5	*5*	0.05	*5*	5.5	*5*	0.5	12.55	**2.0E-07**
DSS23	Bottom	LW104	*5.1*	5.1	*5.1*	0.51	*5.1*	0.51	*5.1*	0.51	*5.1*	0.051	*5.1*	5.61	*5.1*	0.51	12.80	**2.1E-07**
DSS24	Bottom	LW105	8.7	8.7	18	1.8	46	4.6	17	1.7	38	0.38	5.1	5.61	17	1.7	24.49	**3.9E-07**
DSS25	Bottom	LW106	*5*	5	1.8	0.18	4.6	0.46	1.6	0.16	4	0.04	*5*	5.5	1.7	0.17	11.51	**1.9E-07**
DSS26	Bottom	LW107	1.7	1.7	2.9	0.29	6.9	0.69	2	0.2	4.2	0.042	1.1	1.21	2.8	0.28	4.41	**7.1E-08**
DSS27	Bottom	LW108	8.5	8.5	27	2.7	54	5.4	17	1.7	42	0.42	5.8	6.38	19	1.9	27.00	**4.3E-07**
DSS28	Bottom	LW109	11	11	33	3.3	73	7.3	23	2.3	52	0.52	8.2	9.02	26	2.6	36.04	**5.8E-07**
95% UCL calculated using the Pro UCL Software by 95% Chebyshev UCL Method						66.6												
Risk based on 95% UCL of the B(a)P Equivalents						**1.E-06**												

Notes:

Concentrations in *italic underline* denote values which were less than the reporting limits.

PEFs are based on the updated Technical Support Document dated May 2005 (OEHHA 2005)

The PEF for dibenz(a,h)anthracene was calculated using the ratio of inhalation unit risk for dibenz(a,h)anthracene and benzo(a)pyrene as per the 2005 OEHHA document.

µg/kg =micrograms per kilogram
B(a)P= Benzo(a)pyrene
bgs = below ground surface
EPA = Environmental Protection Agency
ID = identification
MCAS = Marine Corps Air Station
PEF = potency equivalency factor
PRL = potential release location

Figures

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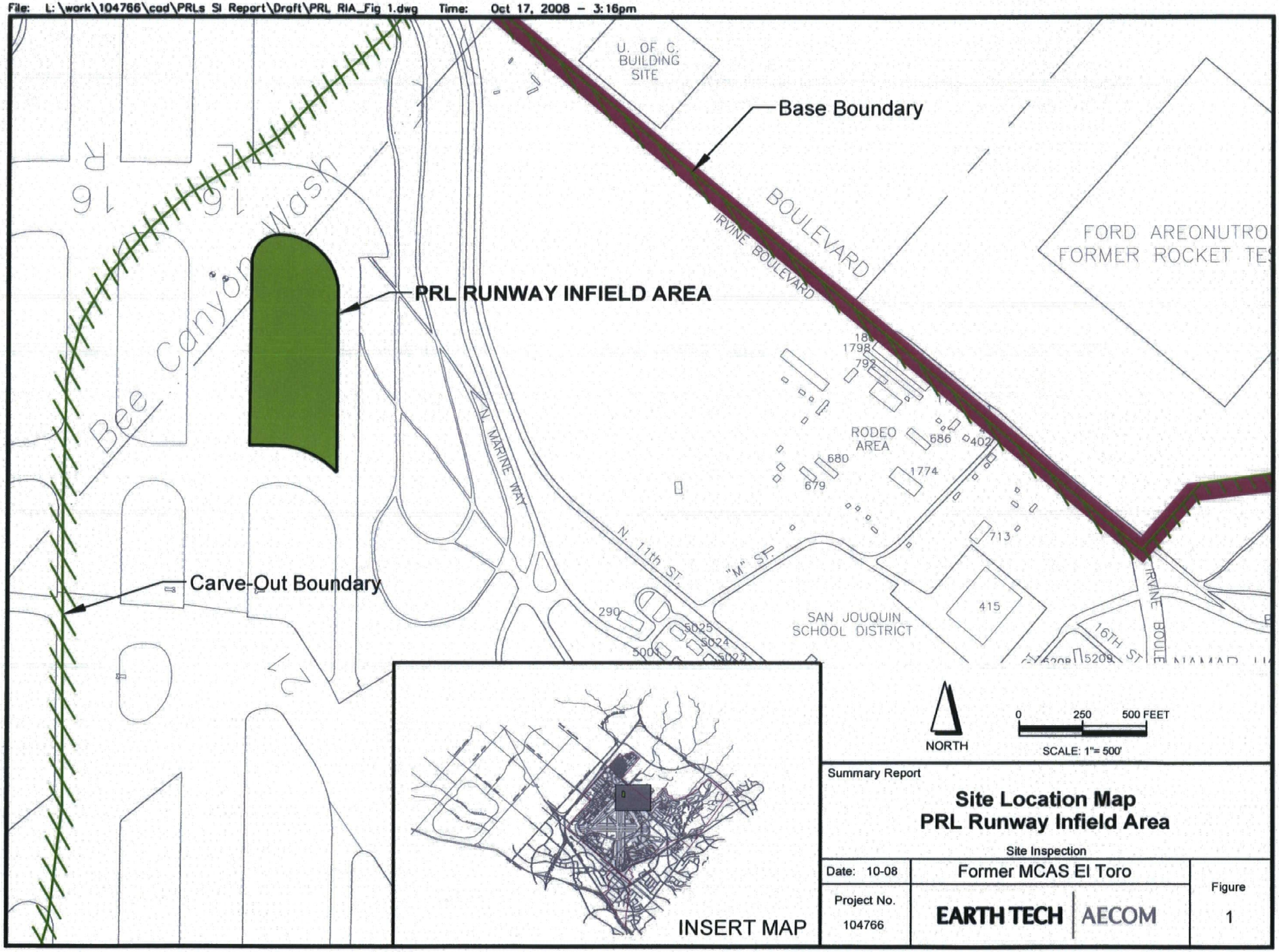
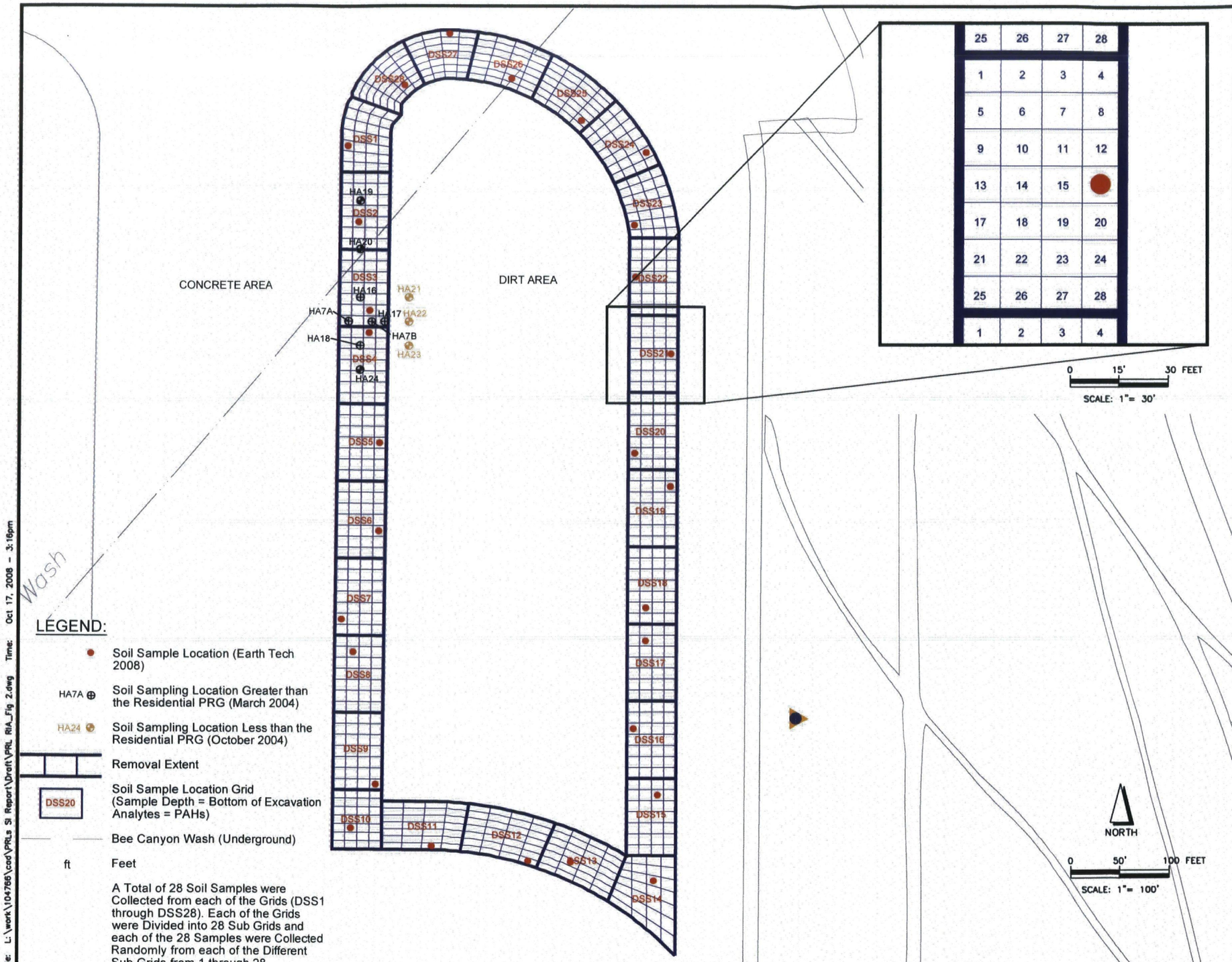


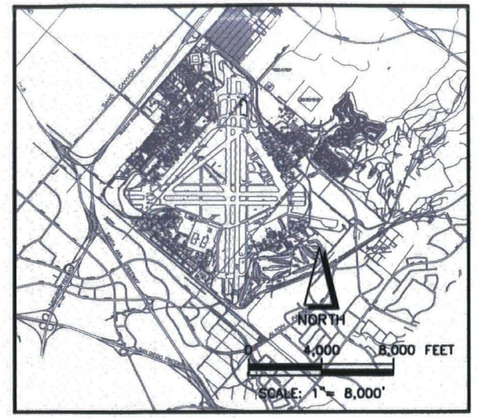
Summary Report

Site Location Map
PRL Runway Infield Area

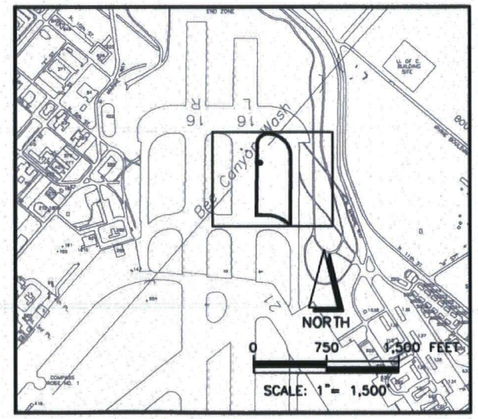
Site Inspection

Date: 10-08	Former MCAS El Toro	Figure
Project No. 104766	EARTH TECH | AECOM	1





Base Map



Area Map

Summary Report

Site Plan
Runway Infield Area

Site Inspection

Date: 10-08	Former MCAS El Toro	Figure 2
Project No. 104766	EARTH TECH | AECOM	

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Appendix A
Previous Soil Sampling Results

Table A-1. Analytical Results Summary - PRL RIA

Analyte	Residential Soil PRG[a]	Sample Location	PRL-RWY- HA7A	PRL-RWY-HA7B	PRL-RIA-HA16	PRL-RIA-HA17	PRL-RIA-HA18	PRL-RIA-HA19	PRL-RIA-HA20	PRL-RIA-HA21	PRL-RIA-HA22	PRL-RIA-HA23	PRL-RIA-HA24
		Sample Depth	0.5' bgs	0.5' bgs	0.5' bgs	0.5' bgs	0.5' bgs	0.5' bgs	0.5' bgs	0.5' bgs	0.5' bgs	0.5' bgs	0.5' bgs
		EPA ID	LJ299	LJ300	LJ301	LJ302	LJ303	LJ335	LJ336	LJ337	LJ338	LJ339	LJ340
Polynuclear Aromatic Hydrocarbons (µg/kg)													
2-Methylnaphthalene	--		3 J	3 J	110 U	27 U	27 U	2 J	2700 U	0.5 J	0.7 J	0.9 J	2 J
Acenaphthene	3.7E+06		17 J	9 J	22 J	27 U	2 J	5 J	2700 U	26 U	0.6 J	0.5 J	7 J
Acenaphthylene	--		140	210	320	28	54	100	340 J	3 J	5 J	7 J	200
Anthracene	2.2E+07		150	130	200	20 J	32	49 J	150 J	2 J	2 J	3 J	80
Benzo(a)anthracene	6.2E+02		573	390	570	47	93	130	460 J	6 J	8 J	7 J	240
Benzo(a)pyrene	6.2E+01		**530**	**480**	**710**	**66**	**130**	**230**	**930 J**	12 J	15 J	19 J	**532**
Benzo(b)fluoranthene	6.2E+02		490	400	**760**	78	110	350	**1200 J**	19 J	26	27	**885**
Benzo(g,h,i)perylene	--		200	210	360	40	65	74 J	560 J	9 J	8 J	11 J	190
Benzo(k)fluoranthene[b]	3.8E+02		**500**	**430**	**610**	62	150	140	**660 J**	6 J	8 J	14 J	150
Chrysene[b]	3.8E+03		579	420	660	72	120	160	740 J	11 J	14 J	17 J	300
Dibenz(a,h)anthracene	6.2E+01		**110**	**110**	**170**	18 J	30	24 J	**130 J**	2 J	2 J	3 J	**66**
Fluoranthene	2.3E+06		921 J	490 J	850	96	140	310	1300 J	21 J	25 J	32	545
Fluorene	2.7E+06		30	14 J	26 J	2 J	3 J	7 J	2700 U	0.4 J	0.5 J	0.5 J	12 J
Indeno(1,2,3-cd)pyrene	6.2E+02		210	220	360	40	68	80 J	530 J	8 J	8 J	10 J	210
Naphthalene[b]	1.7E+03		5 J	6 J	31 J	6 J	3 J	5 J	38 J	0.8 J	1 J	2 J	6 J
Phenanthrene	--		704	210	490	50	55	130	470 J	9 J	9 J	14 J	170
Pyrene	2.3E+06		1,070	666	1,000	100	170	310	1200 J	20 J	23 J	30	629
Total Petroleum Hydrocarbons (mg/kg)													
TPH as Gasoline	--		NA	NA	11 J	11 J	10 J	NA	NA	NA	NA	NA	NA
TPH as Diesel	--		NA	NA	15	3 J	4 J	6 J	84	2 J	3 J	10 U	9 J
TPH as Motor Oil	--		NA	NA	110	23	31	110	760	14	20	13	47

Notes

Concentrations in **bold** indicate values above residential soil PRGs.

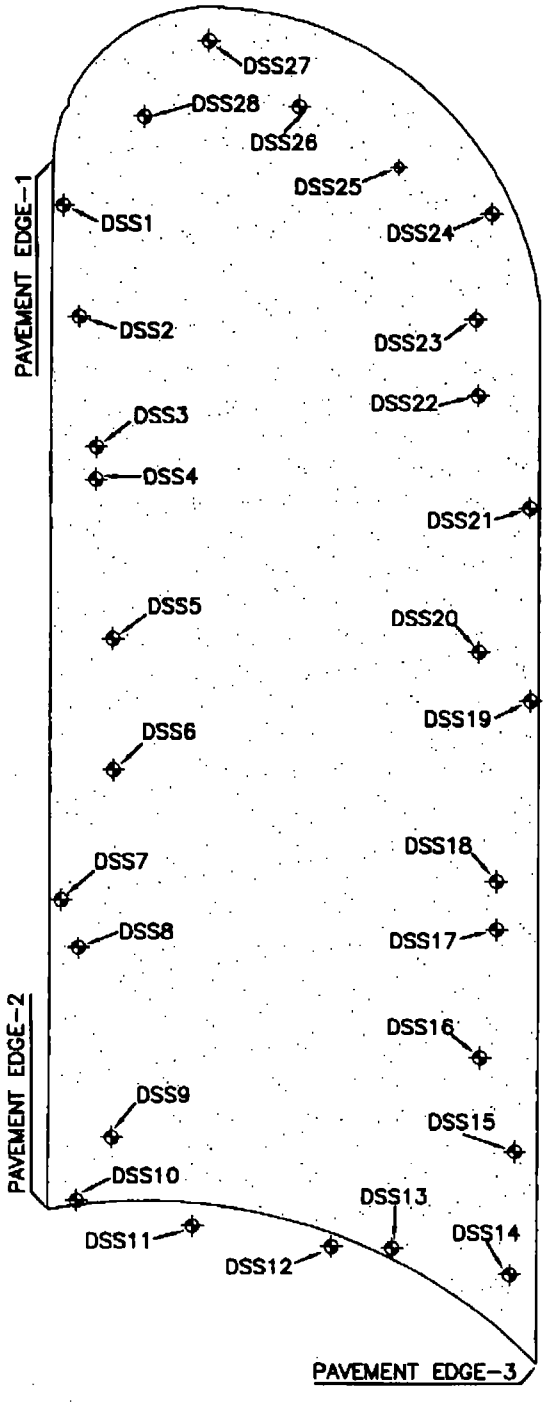
[a]Analytical results for all PAHs were compared to Environmental Protection Agency Region 9 preliminary remediation goals (EPA 2004a), with the exception of benzo(k)fluoranthene, chrysene, and naphthalene (see note b)

[b]Analytical results for benzo(k)fluoranthene, chrysene, and naphthalene were compared to California-Modified PRGs (EPA 2004a) since they are significantly more protective than corresponding EPA Region 9 PRGs.

-- = value does not exist
% = percent
µg/kg = micrograms per kilogram
bgs = below ground surface
EPA = Environmental Protection Agency
ID = identification
J = indicates an estimated value
MCAS = Marine Corps Air Station
mg/kg = milligrams per kilogram
NA = not analyzed
PRG = preliminary remediation goal
PRL = potential release location
RIA = Runways Infield Area
TPH = total petroleum hydrocarbons
U = Indicates the compound or analyte was analyzed for but was not detected at or above the stated limit.
UCL = upper confidence limit

Appendix B
Land Surveying Data

RUNWAY INFIELD AREA



PRL AND NOTABLE FEATURES LOCATIONS			
STATION	NORTHINGS	EASTINGS	ELEV.
PAVEMENT-1	2196426.46	6112249.24	369.89
PAVEMENT-2	2195681.45	6112240.36	369.88
PAVEMENT-3	2195570.35	6112587.14	374.36
DSS1	2196394.65	6112256.33	368.82
DSS2	2196316.00	6112267.52	368.74
DSS3	2196224.23	6112279.13	368.64
DSS4	2196201.13	6112278.53	368.60
DSS5	2196087.22	6112289.53	368.73
DSS6	2195995.77	6112289.03	368.54
DSS7	2195904.33	6112251.18	368.76
DSS8	2195870.27	6112263.01	368.90
DSS9	2195733.15	6112286.16	369.57
DSS10	2195687.73	6112260.89	369.22
DSS11	2195669.30	6112343.04	371.49
DSS12	2195654.33	6112441.86	372.92
DSS13	2195653.11	6112484.95	372.13
DSS14	2195633.82	6112568.53	372.88
DSS15	2195722.73	6112572.55	372.64
DSS16	2195791.17	6112548.19	372.01
DSS17	2195882.51	6112560.52	371.82
DSS18	2195916.69	6112560.71	371.80
DSS19	2196042.46	6112585.83	371.81
DSS20	2196076.99	6112549.35	371.38
DSS21	2196179.85	6112586.25	371.57
DSS22	2196259.75	6112549.94	370.59
DSS23	2196313.06	6112548.54	370.76
DSS24	2196387.97	6112560.26	370.99
DSS25	2196420.85	6112494.47	370.87
DSS26	2196464.11	6112423.67	370.42
DSS27	2196510.45	6112359.55	369.17
DSS28	2196457.28	6112313.78	369.03

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POTENTIAL RELEASE LOCATION SKETCH

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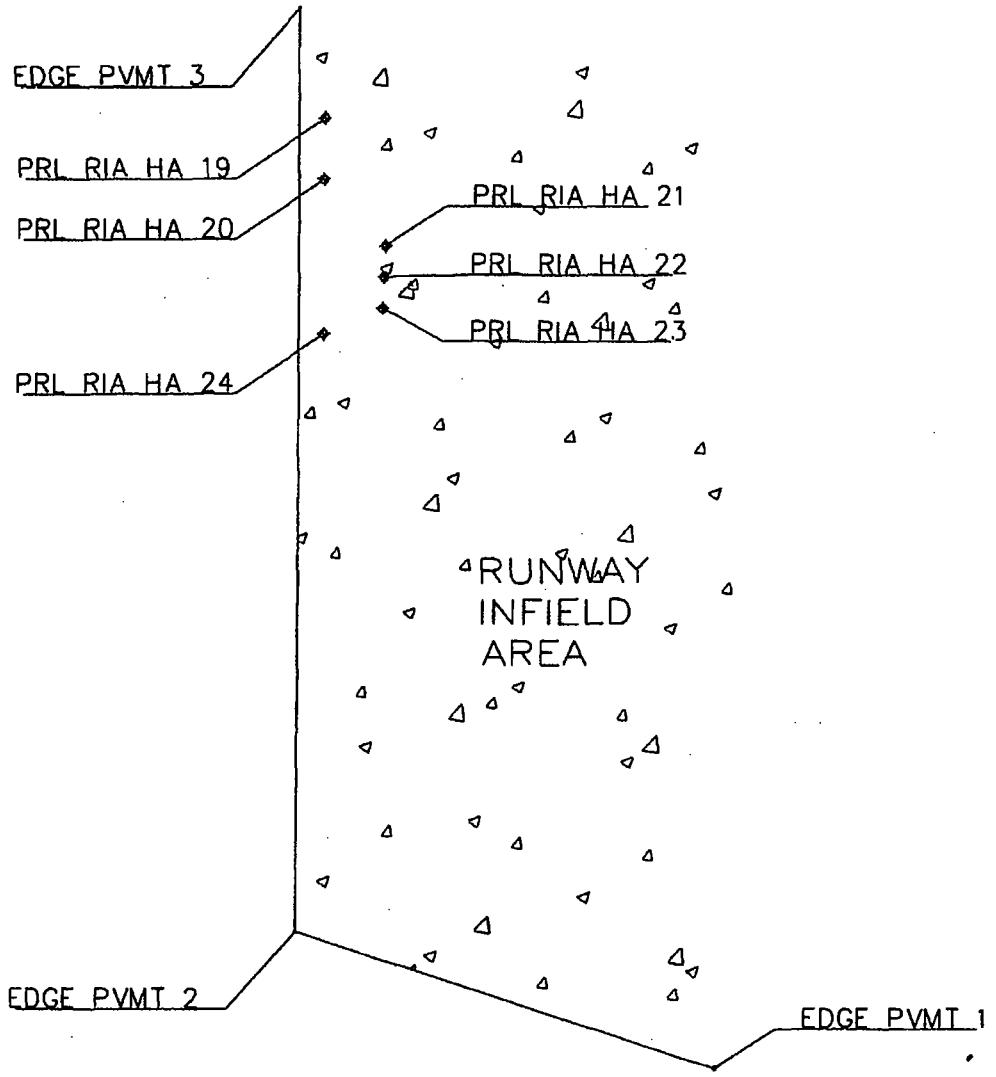
BY: ANK	JOB NO.: 04-1058-2227.000-1019



PRL AND NOTABLE FEATURES LOCATIONS			
STATION	NORTHING	EASTING	ELEVATION
EDGE PVMT 1	2195570.35	6112587.14	374.36
EDGE PVMT 2	2195681.45	6112240.36	369.88
EDGE PVMT 3	2196426.46	6112249.24	369.89
PRL RIA HA 19	2196338.26	6112269.83	369.83
PRL RIA HA 20	2196289.15	6112268.28	369.78
PRL RIA HA 21	2196235.39	6112319.40	368.94
PRL RIA HA 22	2196210.35	6112317.66	368.77
PRL RIA HA 23	2196185.11	6112316.27	369.27
PRL RIA HA 24	2196164.18	6112266.86	369.71

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POTENTIAL RELEASE LOCATION SKETCH

SCALE:	1"= 1000'	DATE:	02-1
BY:	JC	JOB NO.:	04-1058-2227.00